

# Autoliv

The Worldwide Leader in  
Automotive Safety

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Henrik Kaar  
May 7, 2015



**Autoliv**

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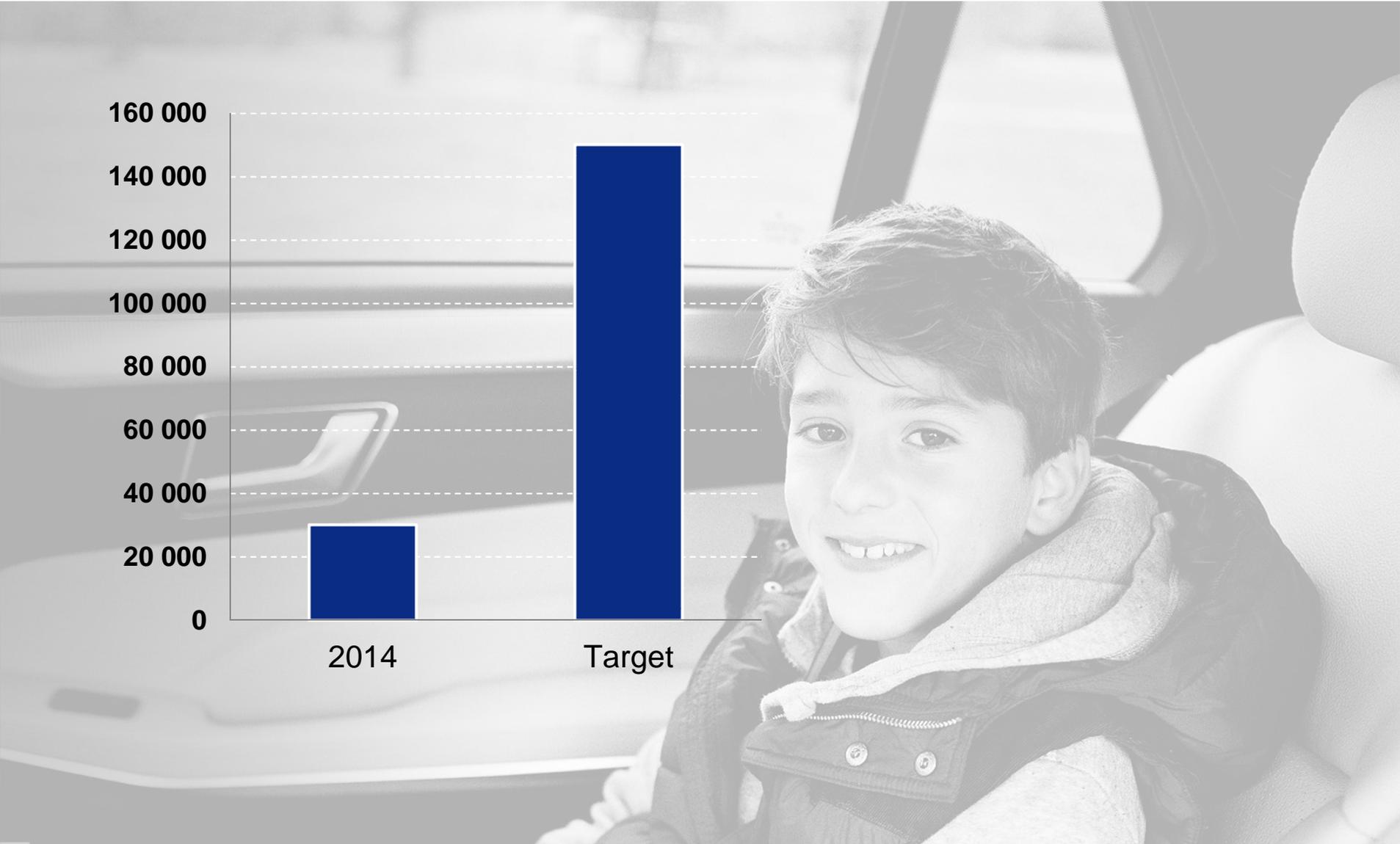
(\*) Non-US GAAP reconciliations are disclosed in our 8-K/10-K/10-Q filings available at [www.sec.gov](http://www.sec.gov) or [www.autoliv.com](http://www.autoliv.com).



Every year **our products**  
**save** over 30,000 lives

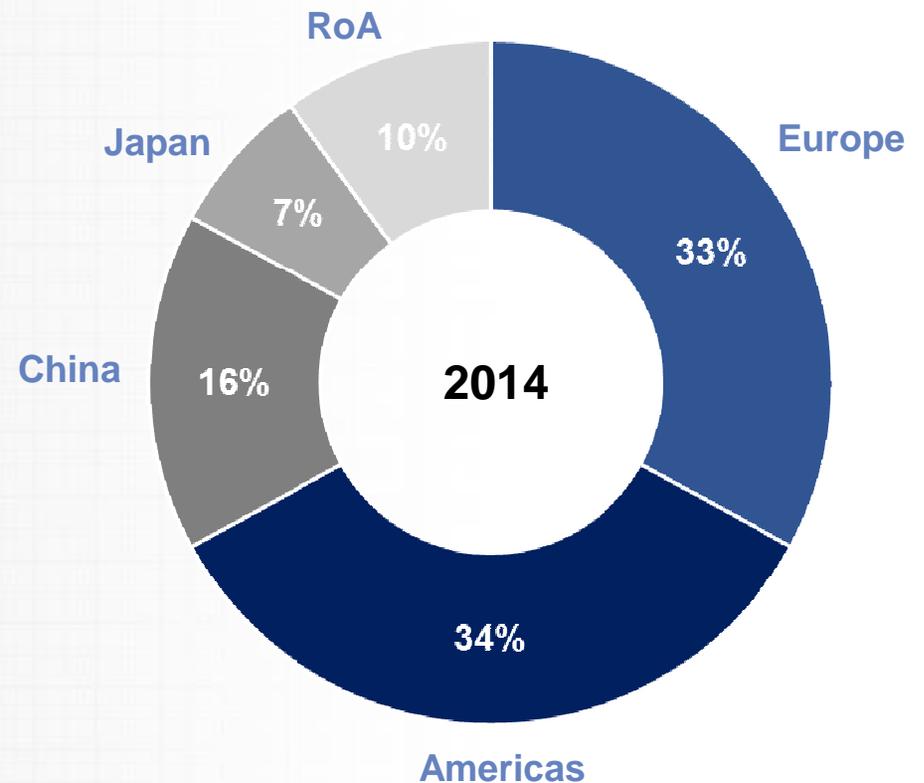
and prevent ten times as  
many severe injuries

# Our Mission



# Autoliv in Brief

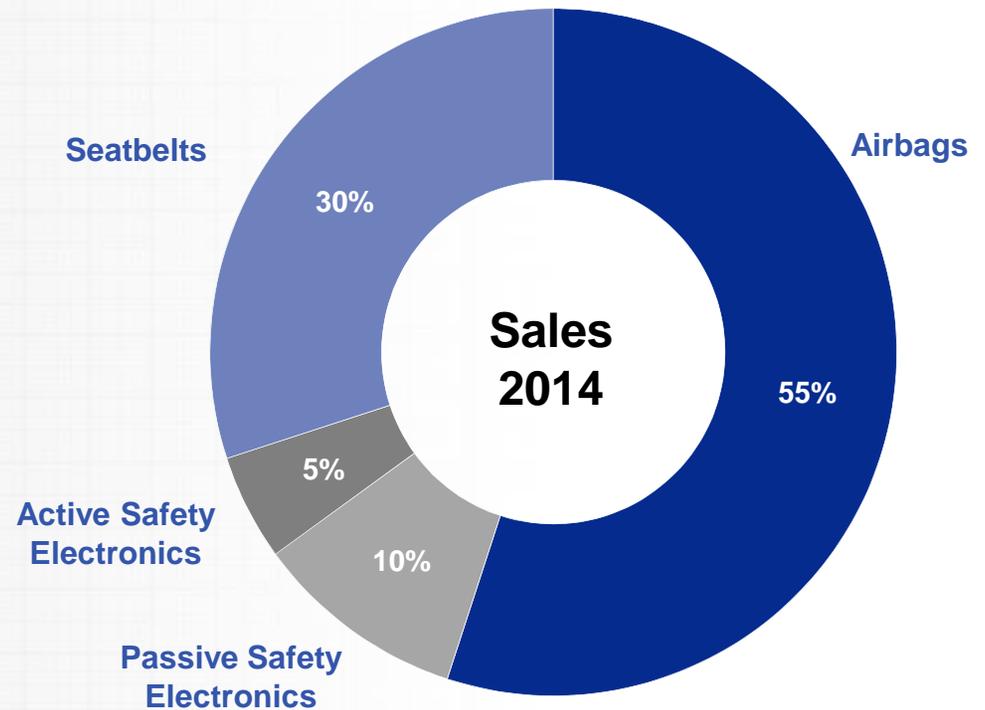
- Sales and technology leader
- Sales US\$9.2 billion
- Sales to all major vehicle manufacturers
- Fortune 500 company with an A- credit rating (S&P)
- ~ 80 facilities in 28 countries
- 18 technical centers and 20 crash test tracks
- > 60,000 associates of which ~ 5,500 in R,D&E



Well balanced geographic presence

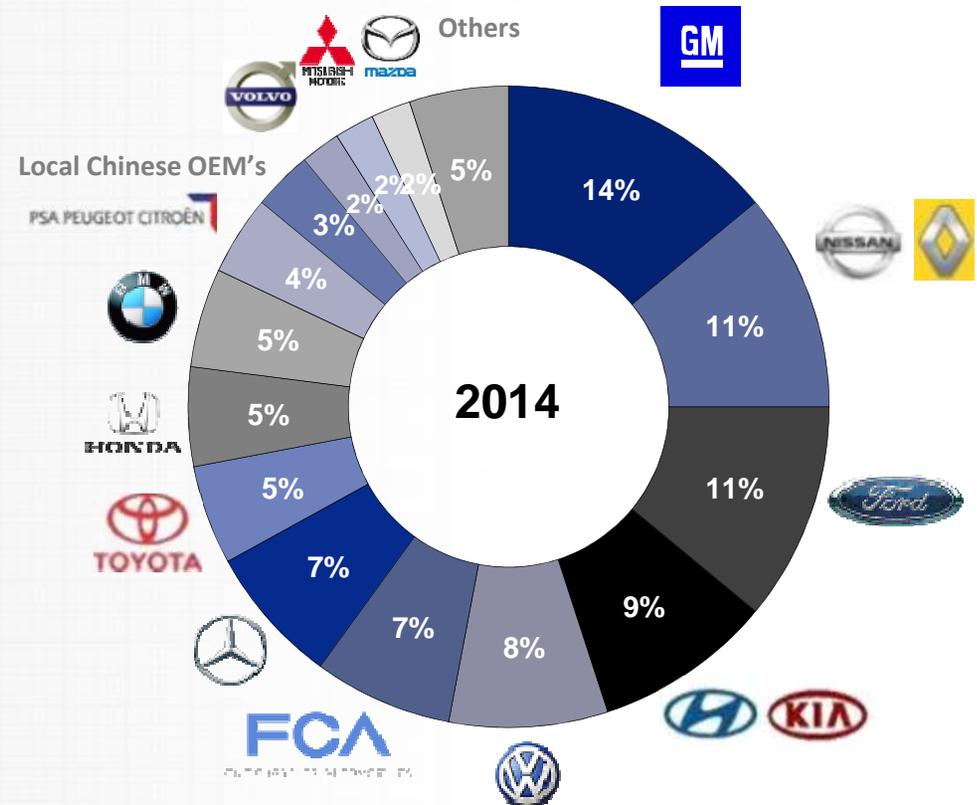
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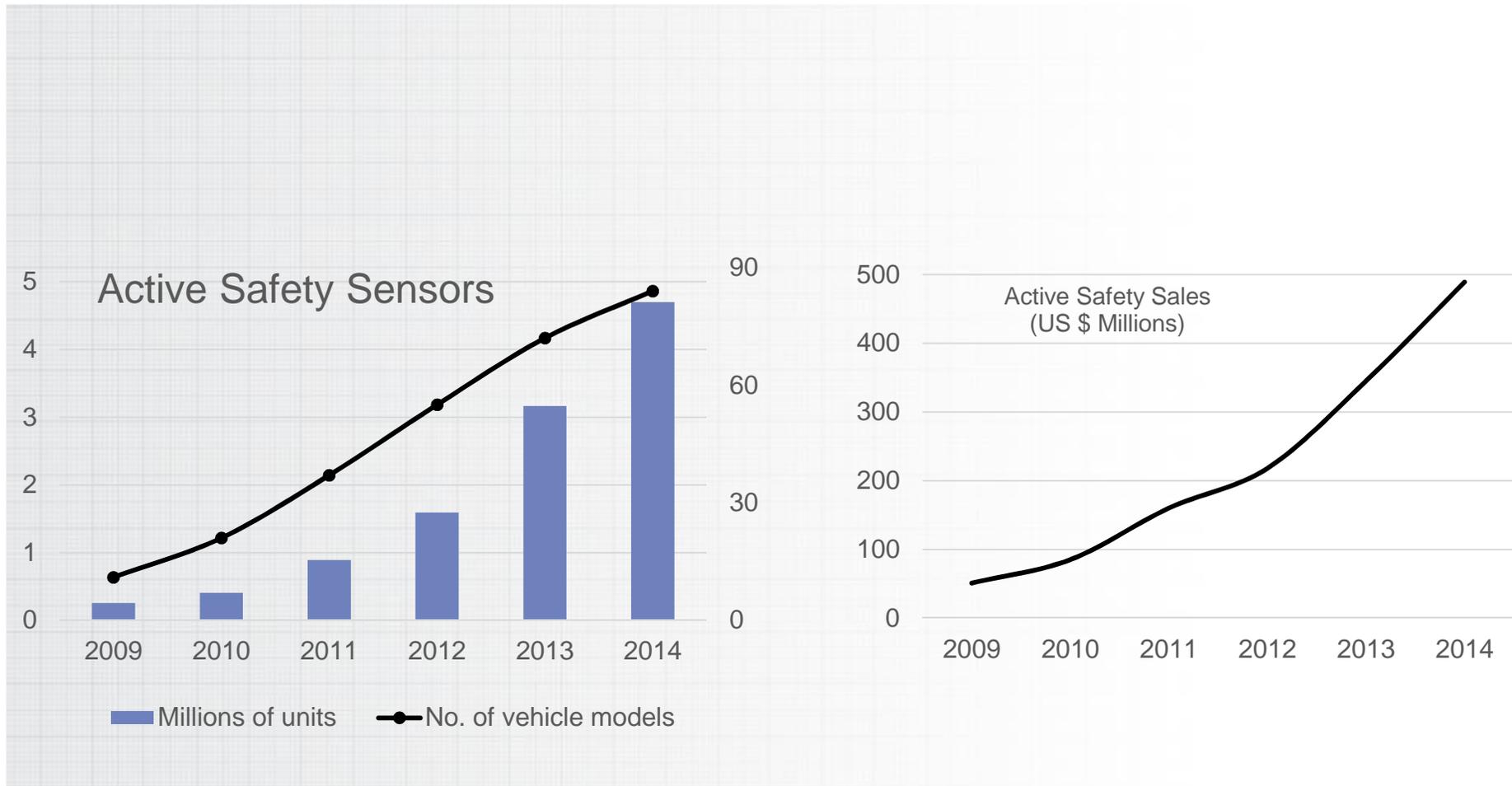
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Our diversified customer base includes virtually all the world's vehicle manufacturers

# Executing our Growth Strategies

- Active Safety organic sales\* growth ~ 45% in FY'14

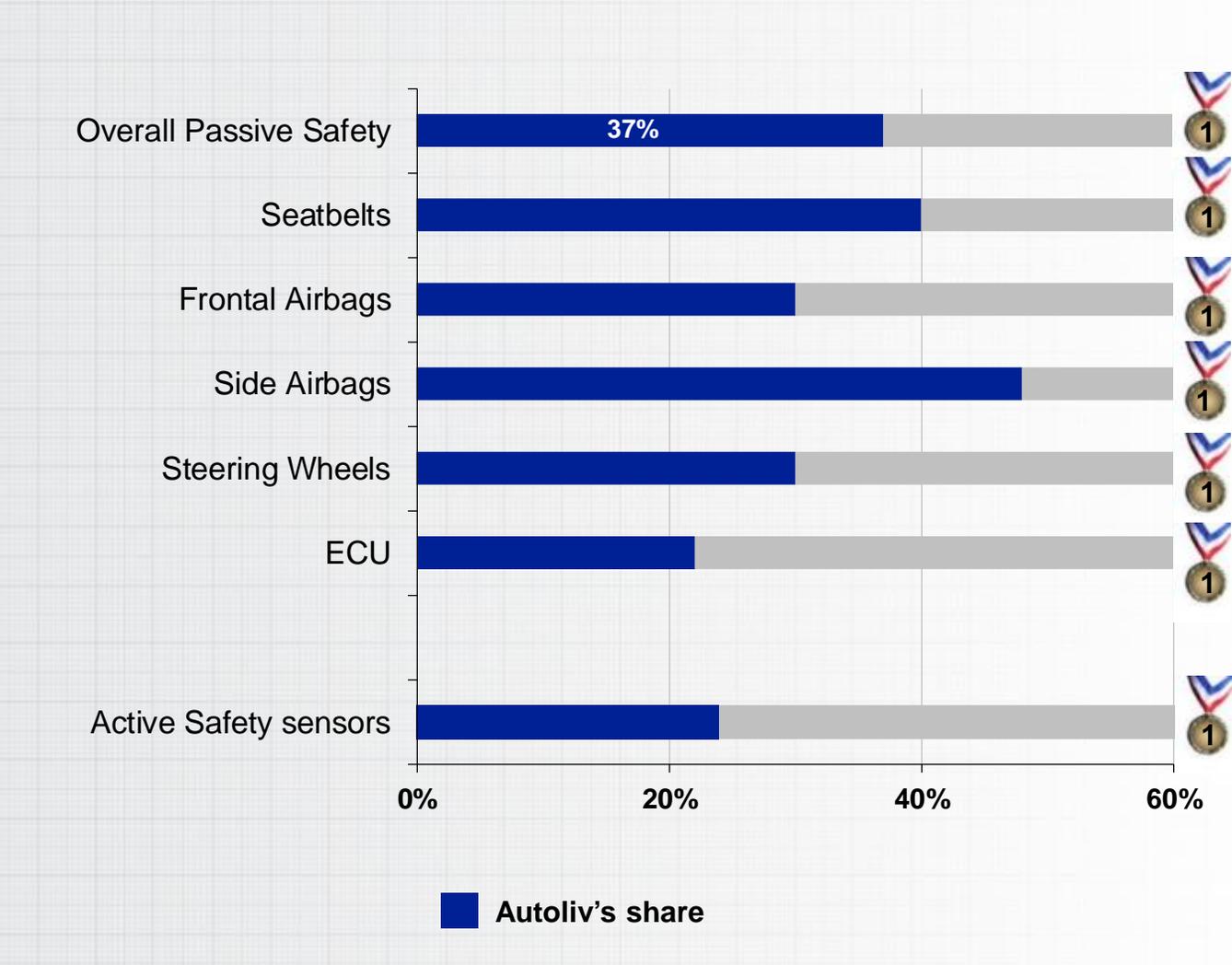


🚗 Technology investments for active safety is contributing to top-line sales growth.

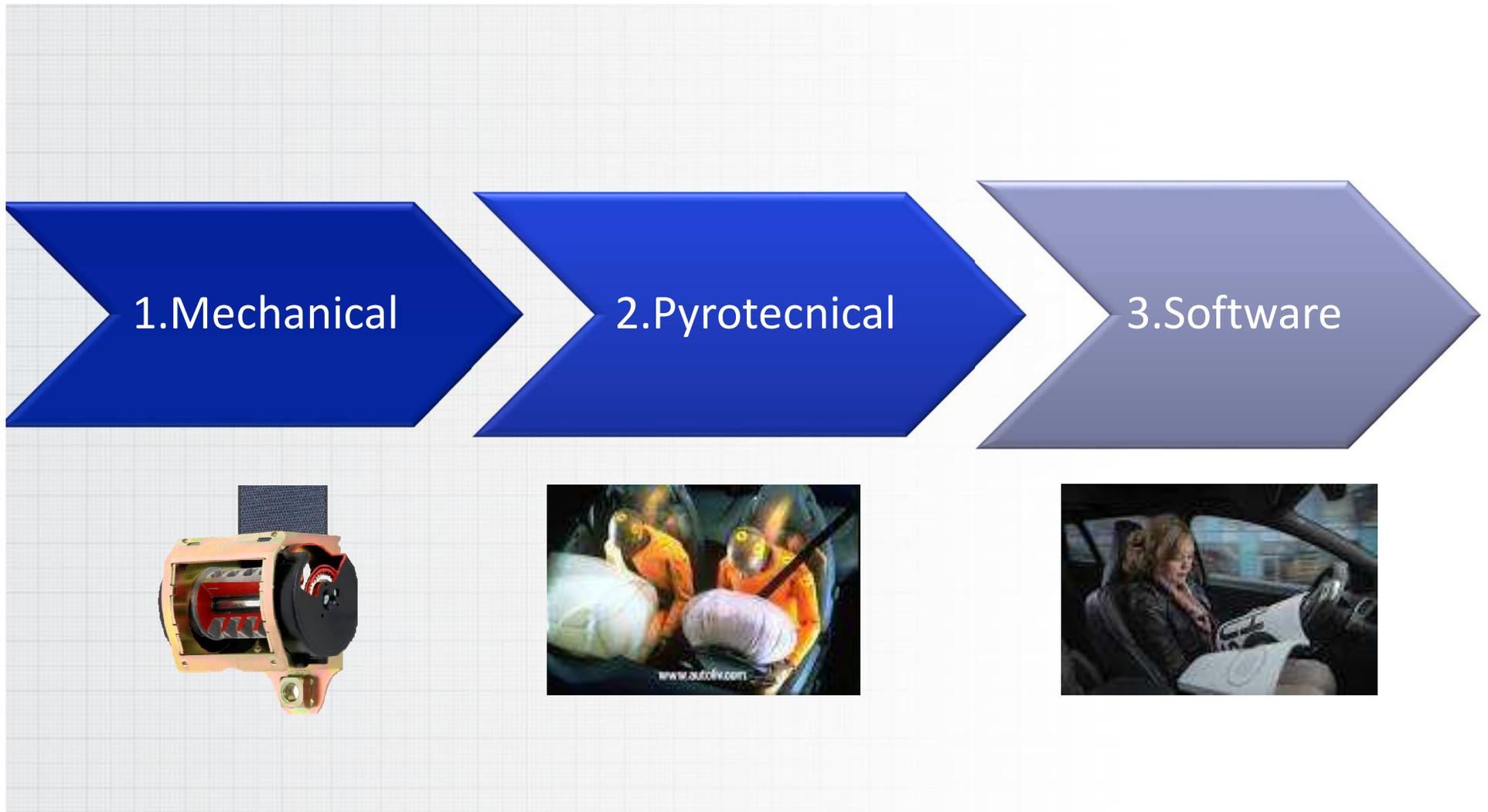
(\*) Non-US GAAP measure.

# Market Shares 2014

## - Global Safety Market Share by Product

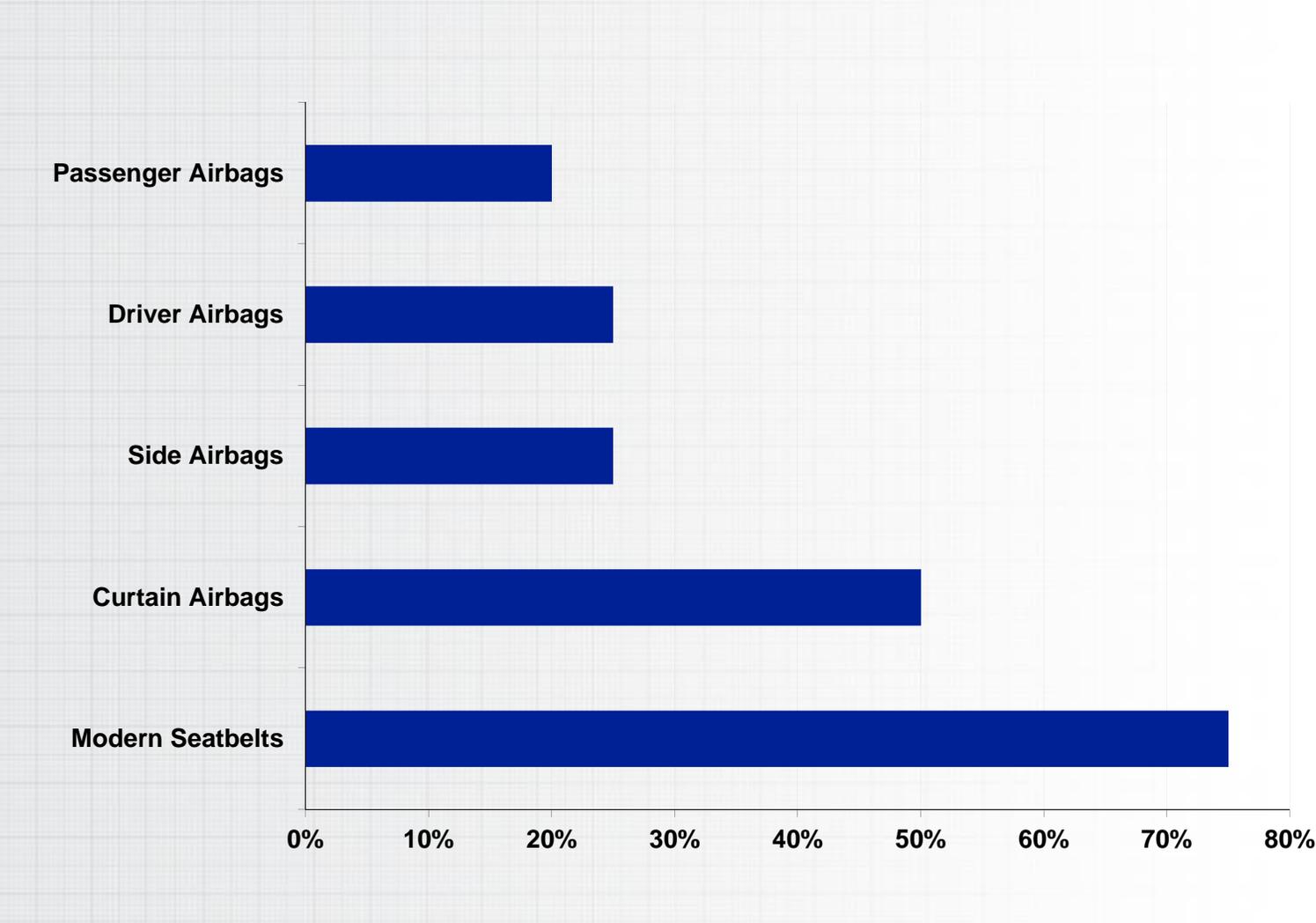


# Towards saving more lives -the three phases of Autoliv



# Reduction of Life-Threatening Injuries

- by Major Product Types



# Automated Driving

Traffic Deaths



**By eliminating human errors that cause traffic accidents, Automated Driving can:**

- Prevent millions of crashes
- Reduce the severity of injuries and property damage
- Save lives

**Additional benefits:**

- Increase driver comfort and productivity
- Use infrastructure more efficiently
- Reduce environmental impact
- Improve mobility

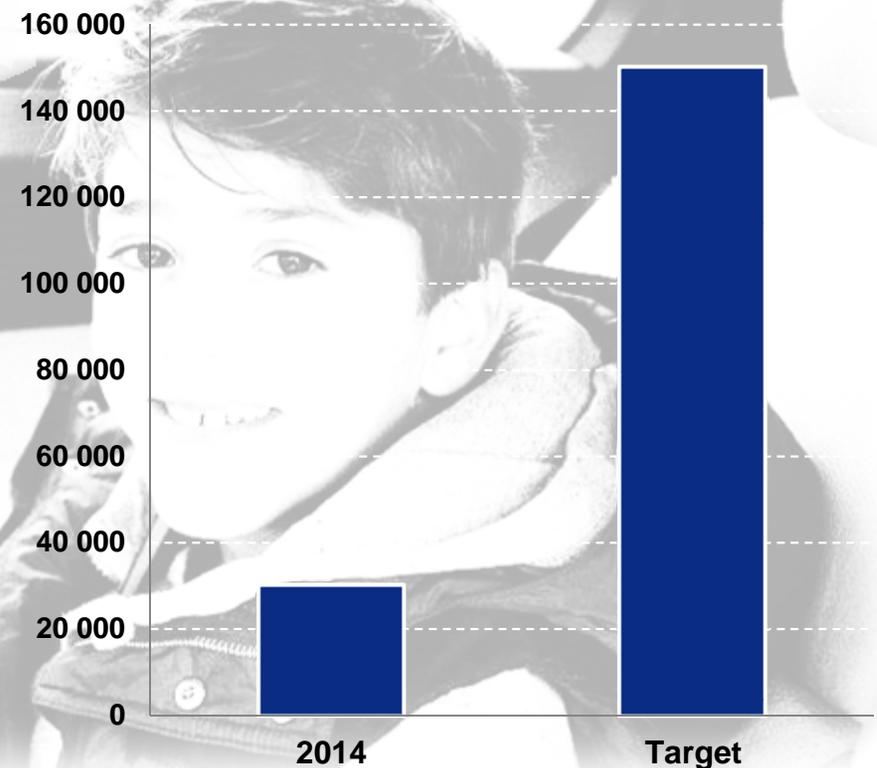
# Autoliv's Role in the Autonomous World

## Our approach

- The Autoliv approach to ADAS and AD derives from our heritage and continuous strive to save lives in traffic.

### Human lives saved by our products

*...additionally they prevent ten times as many severe injuries*



# Evolution of Driver Assistance



# Merging Roads

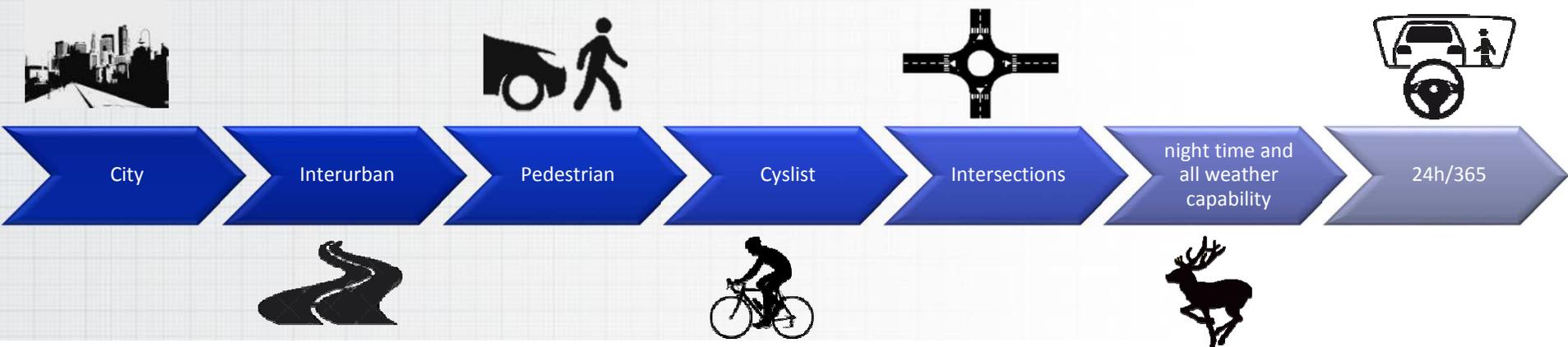
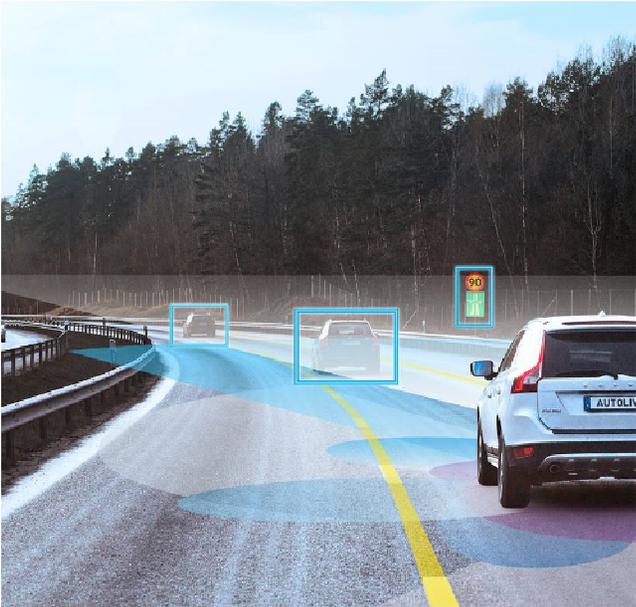


# Autonomous Emergency Braking (AEB)

an important enabler for Automated driving

## Autoliv

- Radar based AEB in production since 2013
- Sensor fusion AEB launching in 2015
- Vision based collision warning launching in 2015



# 2015 Autoliv Vision System

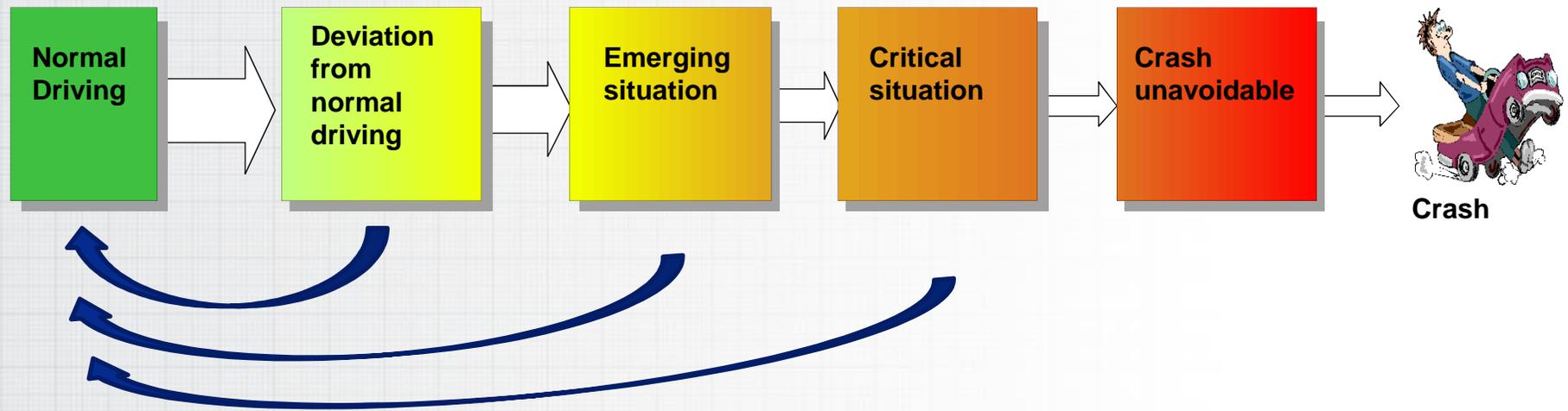
## -In-house developed algorithms for scalability

	Lane Departure Lane Keep Assist	High-Beam Assist	Traffic Sign Recognition	Automatic Emergency Braking	Pedestrian Protection	Free Space Road Surface
<b>Premium</b> 	 					
<b>Safety / NCAP</b> 	 					
<b>Assist</b> 	 					

# On the Road towards Autonomous Cars



# Lives saved earlier in the integrated safety chain



📍 This is how we can save 150,000 lives

# Safety opportunity and risk with Automated driving level 3

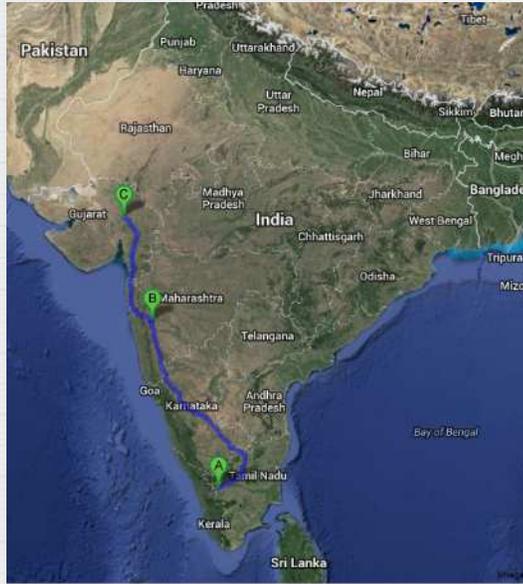
<p><b>“Normal” driving</b></p>	<p>Situations that do not lead to accidents</p>	<p>Situations that lead to accidents</p>
	<ul style="list-style-type: none"> <li>▪ Normal driving</li> <li>▪ Near-miss events</li> </ul> <p>Driver solves the situation</p>	<p>Driver not sufficient</p>
<p><b>“Eyes off”</b></p>	<p>Situations that do not lead to accidents</p>	<p>Situations that lead to accidents</p>
	<ul style="list-style-type: none"> <li>▪ Normal driving</li> <li>▪ Near-miss events</li> </ul> <p>Driver solves the situation</p>	<p>Driver not sufficient</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">OPPORTUNITY</p>

# Consequence of higher level of automation

- Need to understand drivers in the integrated safety chain meaning research in:
  - Accidents & incidents
  - biomechanics
  - human factors



# In-Depth accident Studies



**BS12**

one OEM.

Bo Sui; 2015-04-09

# AEB consequence



AEB Prepretensioner



AEB reference

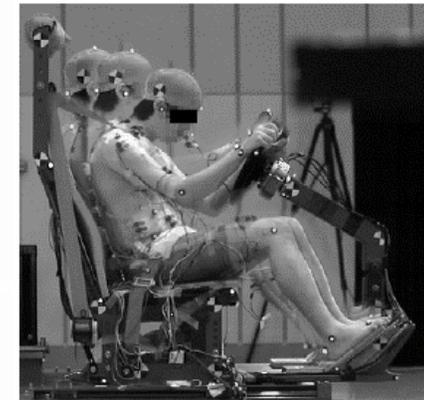
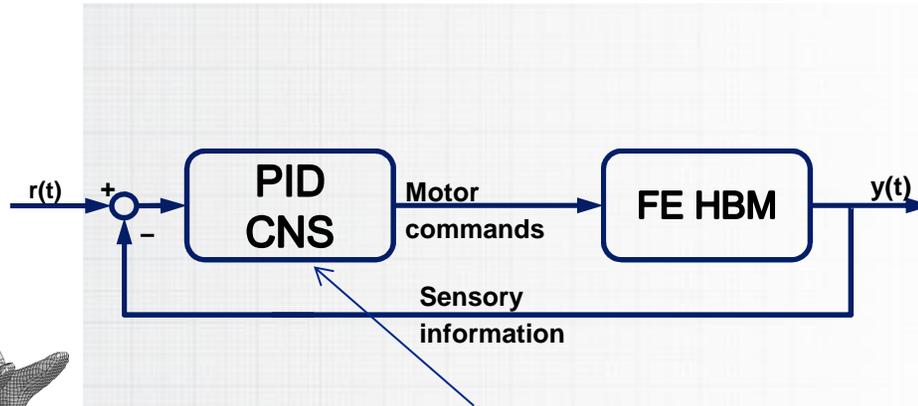
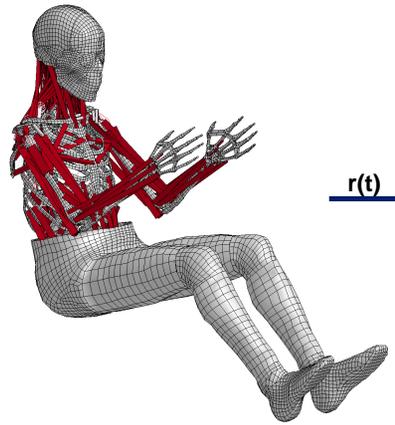


Driver Brake

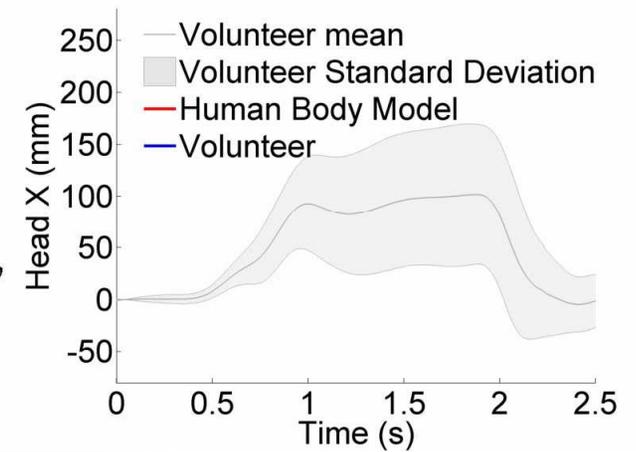


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# Tool for integrated safety design

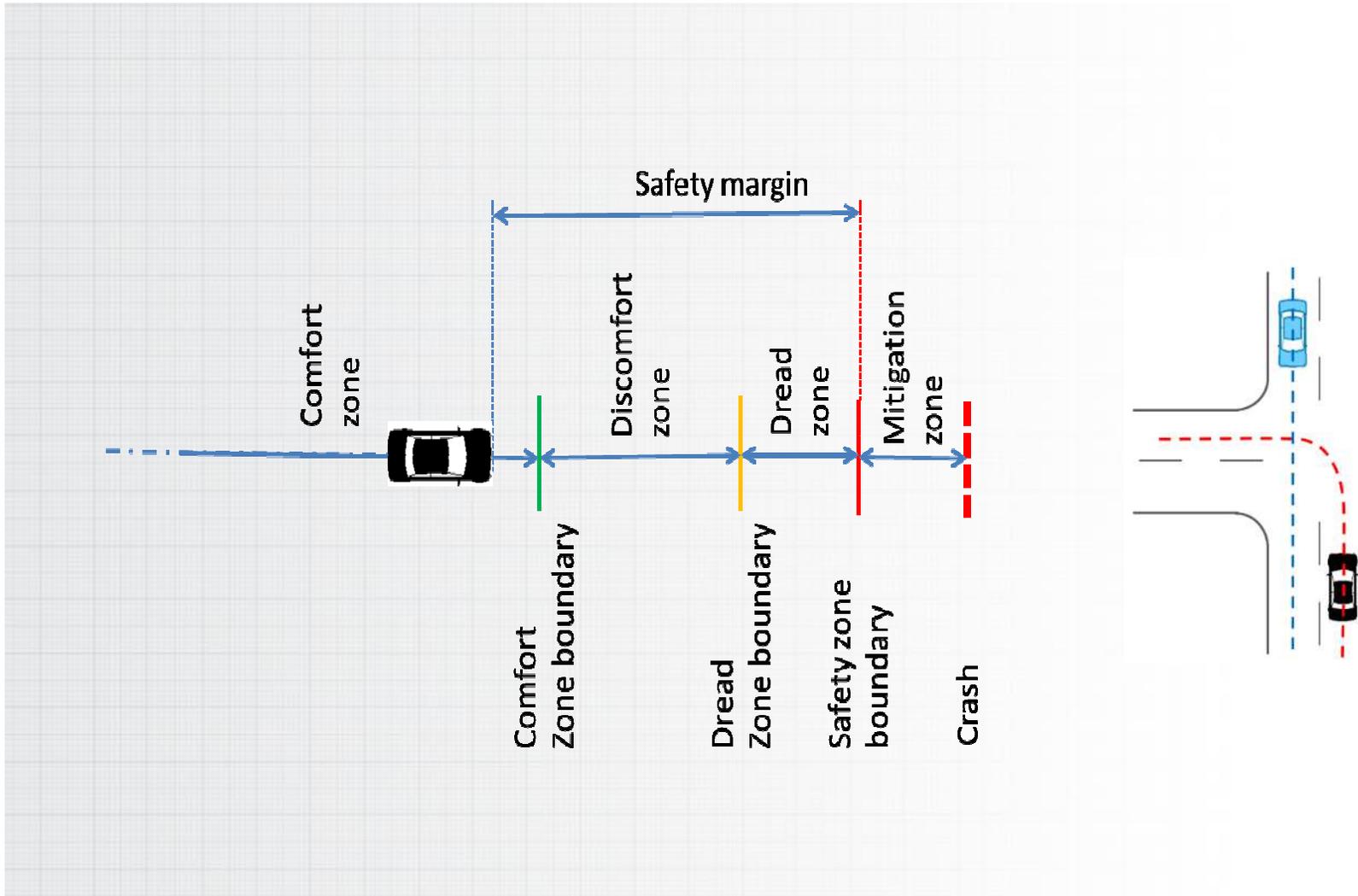


Ejima et al. (2008)



# Simulation of complete event: braking and crash

# Comfort boundaries

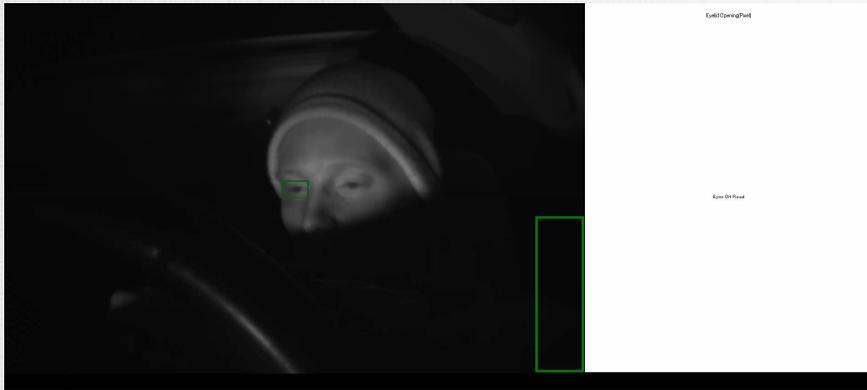


# Sober driver by seamless alcosenensing

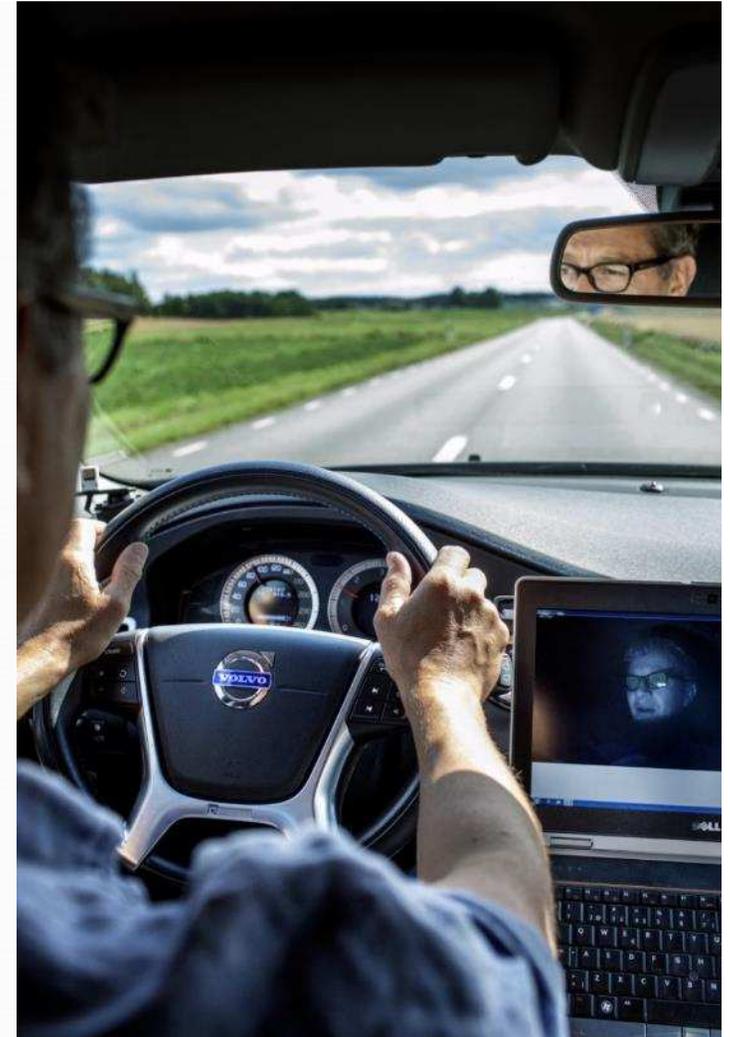


- Air from the driver is measured in a sensor with mirrored IR detecting alcohol and CO2
- No mouth piece
- No recalibration

# EyesOnRoad



- Detect if the driver:
  - looks away from the road
  - is sleepy/drowsy
- Adaptivity for active safety functions like emergency brake
- Enables advanced automated driving systems



# HandsOnWheel

## With AIR Multisensing Neonode technology

### New automated driving unit

« Hands on the wheel / Eyes on the road »

Demonstrator shown during 2015 CES at Las Vegas



High resolution sensor with the option to create virtual buttons using the sensor RGB LED's

# Summary

## Higher level of automation:

- Precrash sensing in most crashes
- Higher demand on driver (state)
- Higher demand of adaptive active safety



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