المنتدى العالمي « الشباب سفراء السلامة على الطرقات

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Technologies avancées de securité pour le transport publique routier

Advanced safety technologies for road public transport

Francesco Filippi

Centre for Transport and Logistics

Sapienza University, Rome

Centre for Transport and Logistics

Based in the School of Engineering, Sapienza University, Rome, CTL promotes cooperation with the business community and public institutions.

Recent EU projects where CTL is:

- Partner, ADAS&ME, to develop Advanced Driver Assistance Systems (ADAS), initiated September 2016
- Coordinator, SaferAfrica, initiated October 2016
- Coordinator, CityMobil2 (CM2) on automated vehicles, ended October 2016.

Full automation

Before and after CM2

Before CM2 – Business Park Rivium

Netherlands 1999

Patronage: 3500 passengers daily

Peak capacity: 500 p/h, headway 2.5 minutes

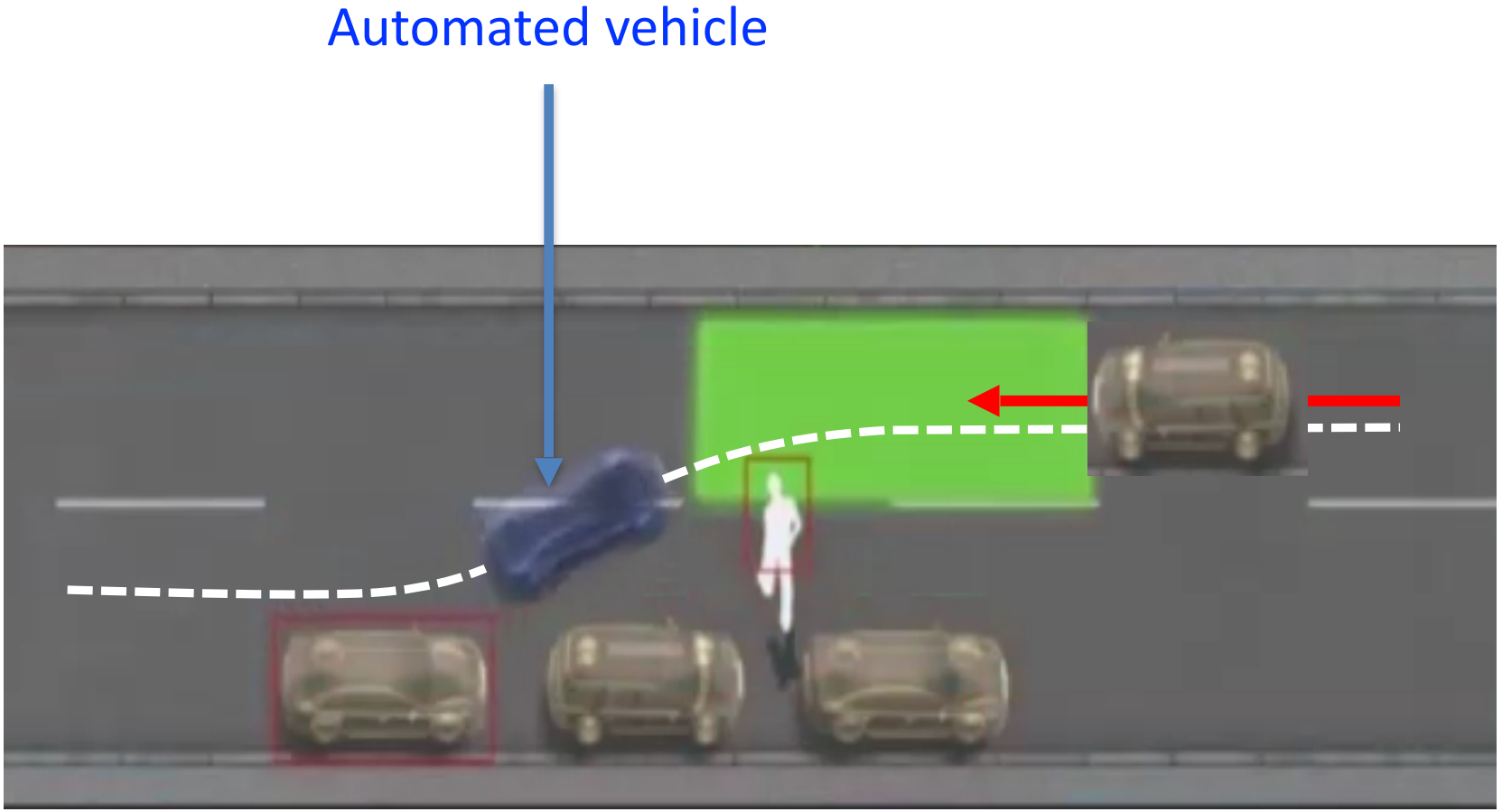
6 vehicles electric drive

Track length 1800 m with 8 stops and 6 crossings

CM2 - Oristano (IT)

CM2 - La Rochelle (FR)

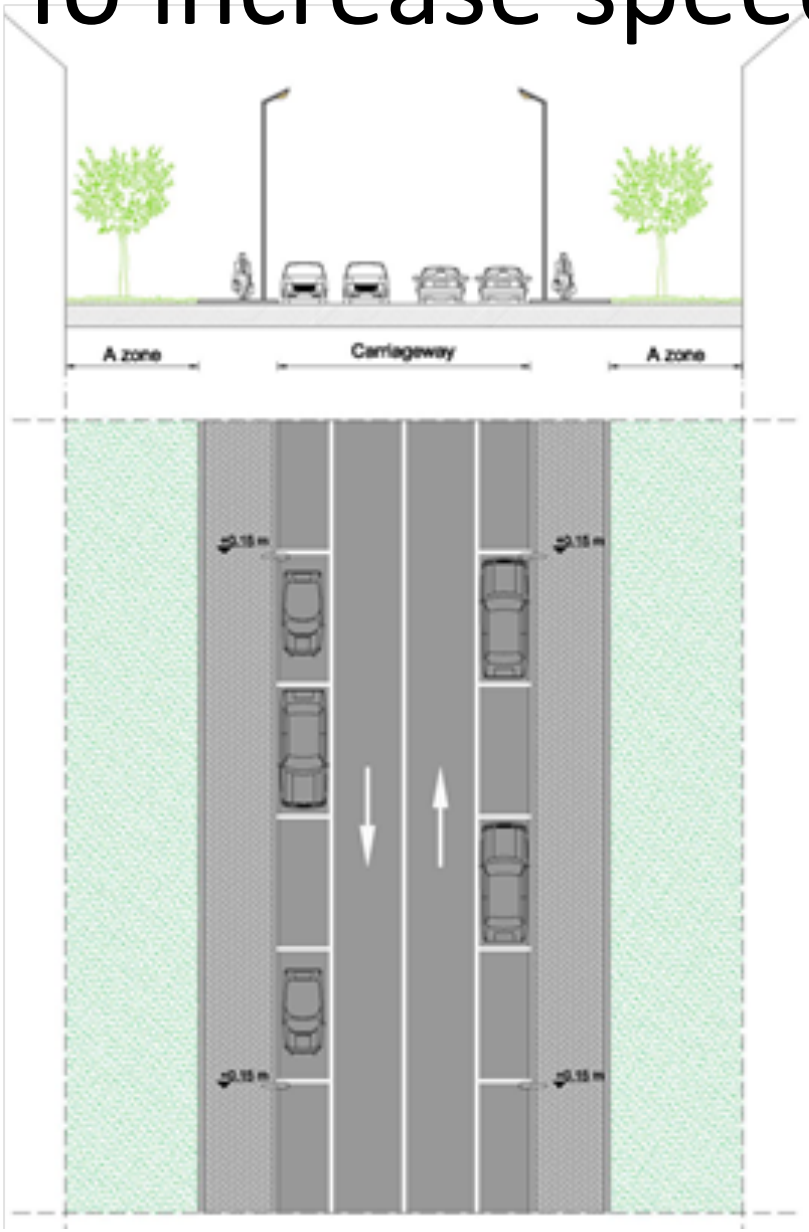
Lack of visibility possible conflict

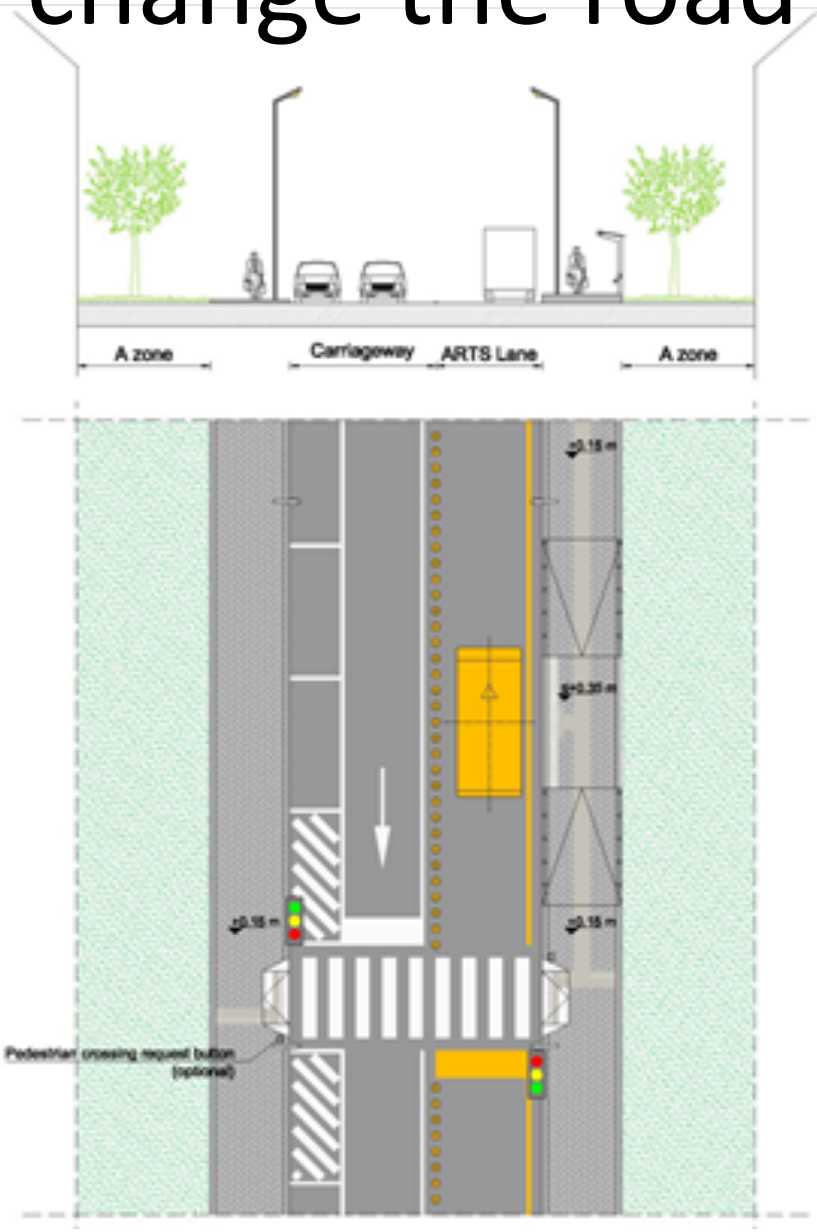


The safe solution

Slow down and prepare to brake in a few metres!

To increase speed, change the road



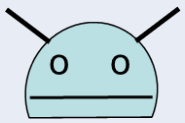


Safe to cross

Before full automation

Human Factor Evaluation of ADAS
Level 1 to 3

Levels of Driving to Partial Automation

L	Name	Narrative Definition	Execution
1	No Autom.	Full-time performance by the *human driver*, even when enhanced by warning or intervention systems	
3	Partial Autom.	Execution by one or more driver assistance systems of both steering and acc./dec. using information about the environment with human driver performing all other aspects	

Advanced bus technologies (examples)

Enhanced capabilities

- Intelligent High-Beam Control
- Cameras for Blind Spot
- Augmented Reality – head-up display (AR-HUD)

Warnings and alerts

- Headway Monitoring and Warning
- Forward Collision Warning (FCW)
- Lane-departure Warnings

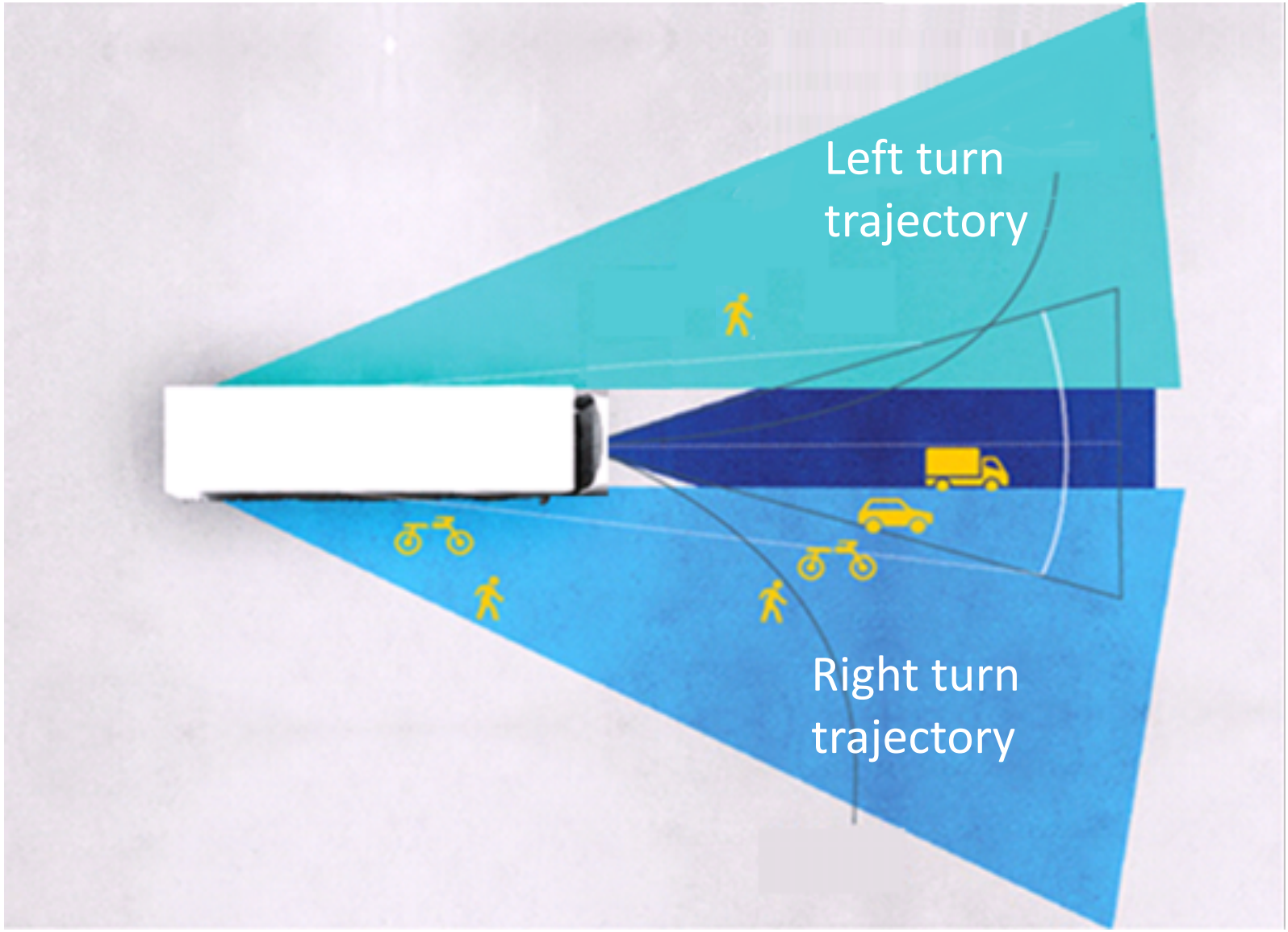
Driver assistance

- Advanced Emergency Braking (AEB)

Enhanced capacity

- Drivers are better informed of driving and conditions, including the state of the automobile, the road, and other cars.
- They should make drivers much more comfortable.
- But too much information can lead to distraction and a failure to attend to any of it.
- Some information can be used efficiently for training.

Cameras for blind spots



The vision

No automation, but warnings

- The advisory systems have some limitations:
- They may fail to alert or even alert too much.
- Some drivers may substitute listening for alerts and alarms for actually paying attention.
- Alerts can be startling and multiple alerts sound simultaneously; they can overload and confuse.
- The time available to react may be only a fraction of a second.

Assistance and partial automation

- Relieving drivers of even one task can increase drowsiness and reduce vigilance.
- Drivers take more time to respond to sudden events when they use cruise control.
- If you take drivers out of the role of active control, it is hard to get them back in when needed.
- Drivers using automation are less anticipative in an emergency than when driving manually.

A recent trial

The technology assessed was a Warning System, with auditory and visual warnings in four cases:

insufficient headway to the vehicle ahead (Headway Monitoring Warnings HMW);

risk of a forward collision (FCW) alerts up to 2.7 s before a collision;

lane departure without the activation of an indicator (Lane Departure Warnings LDW);

risk of a pedestrian collision (Pedestrian Collision Warnings PCW).

The three stages

The fleet trial and data collection were set up to run in three stages:

- Stage 1 Baseline for three months, 180.000 bus-km;
- Stage 2 Active for three months, 140.000 bus-km;
- Stage 3 Silent for one months, 40.000 bus-km.

Average n. of events per 1,000 km

Event	Stage 1 Baseline	Stage 2 Active	Stage 3 Silent	Total
HMW	229.0	211.5	220.4	221.1
LDW	98.2	71.0	104.4	88.3
FCW	9.7	8.6	9.7	9.3

Main finding from the survey

The drivers viewed the technology positively with regard to its general use for other drivers but were negative about its use specifically for themselves:

- 64% believed that it is useful technology to have in a vehicle
- 59% reported that it could lead to a reduction in crashes
- 67% did not believe that the system was of great use to them
- 65% did not think that it would stop them having a crash
- 52% of the respondents encountered malfunctions
- They repeatedly reported that was distracting and annoying
- The distractions of the warnings made driving more dangerous because they took the drivers' focus away from the road.