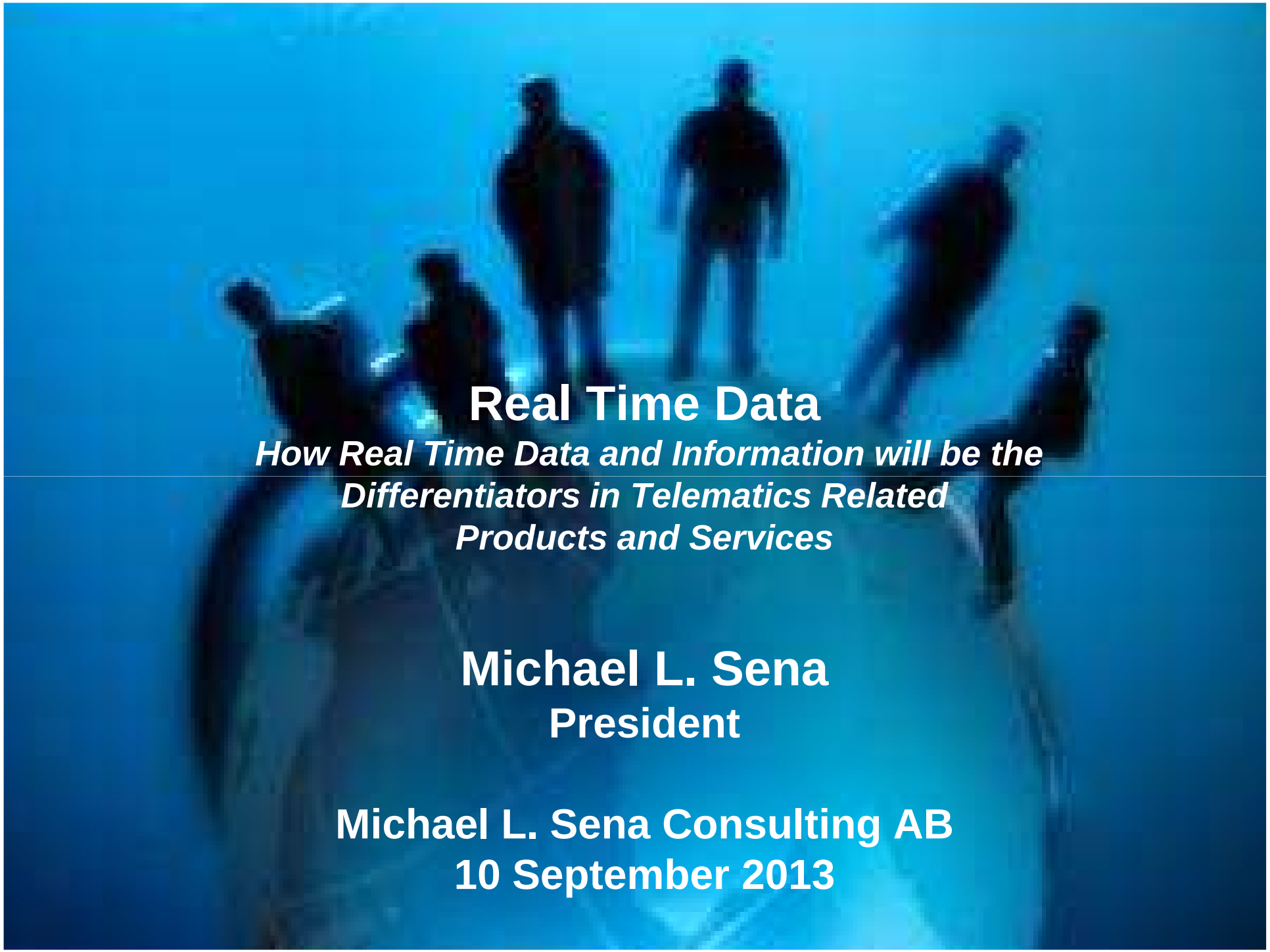


Real Time Data

How Real Time Data and Information will be the Differentiators in Telematics Related Products and Services

Michael L. Sena

President

Michael L. Sena Consulting AB

10 September 2013

Instead of trying to fit a 3-hour workshop into a 20-minute presentation—which is what I usually do—I have taken one of my ideas about where I believe our Telematics industry should be heading with respect to real time data.

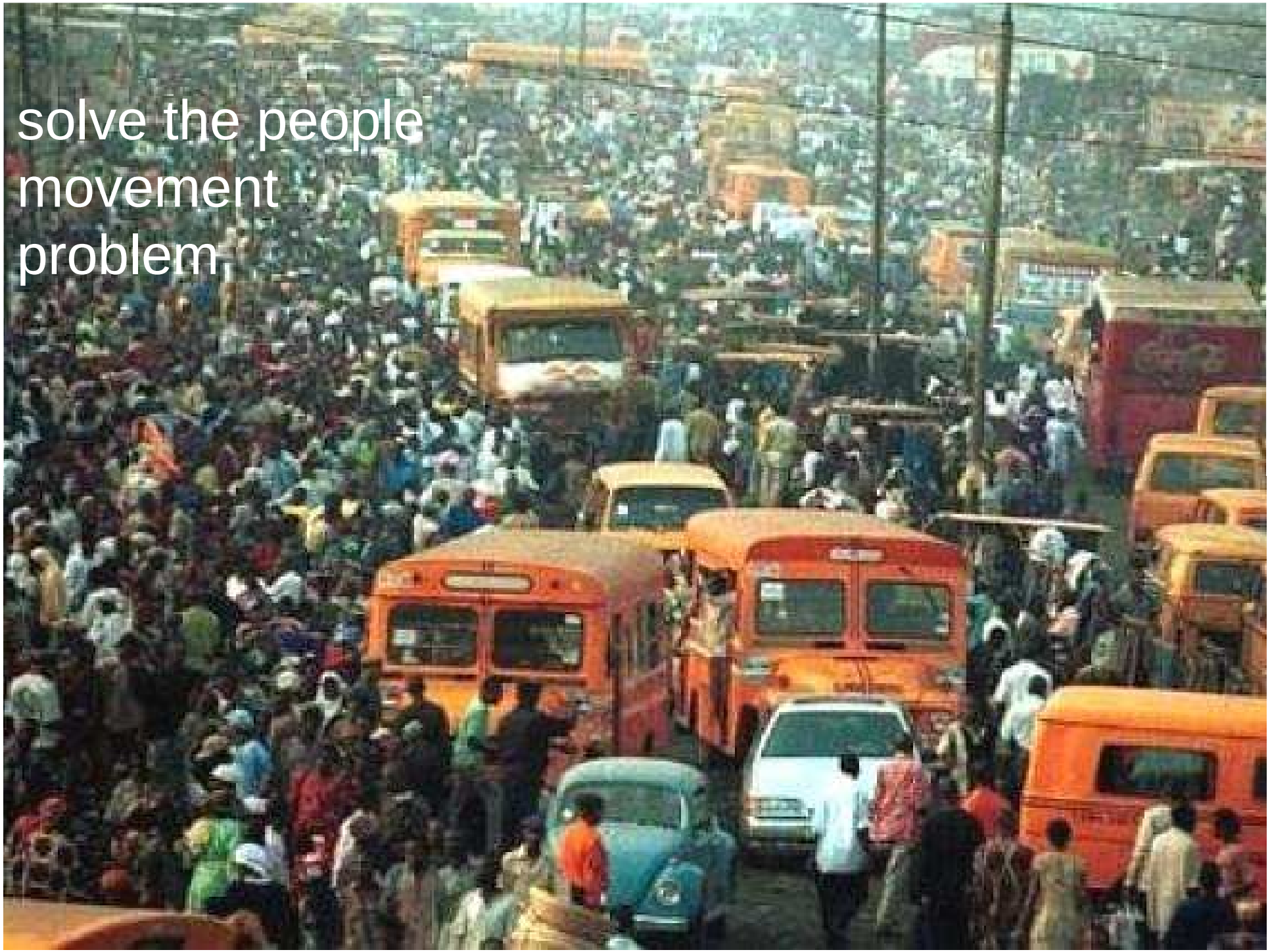
According to research by IBM, we create 2.5 quintillion bytes of data every day. That is 2,5 billion gigabytes. This is real time data. The study says that 90% of the data we have stored up to today was created in the past two years.

There are fewer and fewer ways vehicle manufacturers can differentiate their products, and bringing data into the vehicle and using it them to assist the driver has become a new battleground.

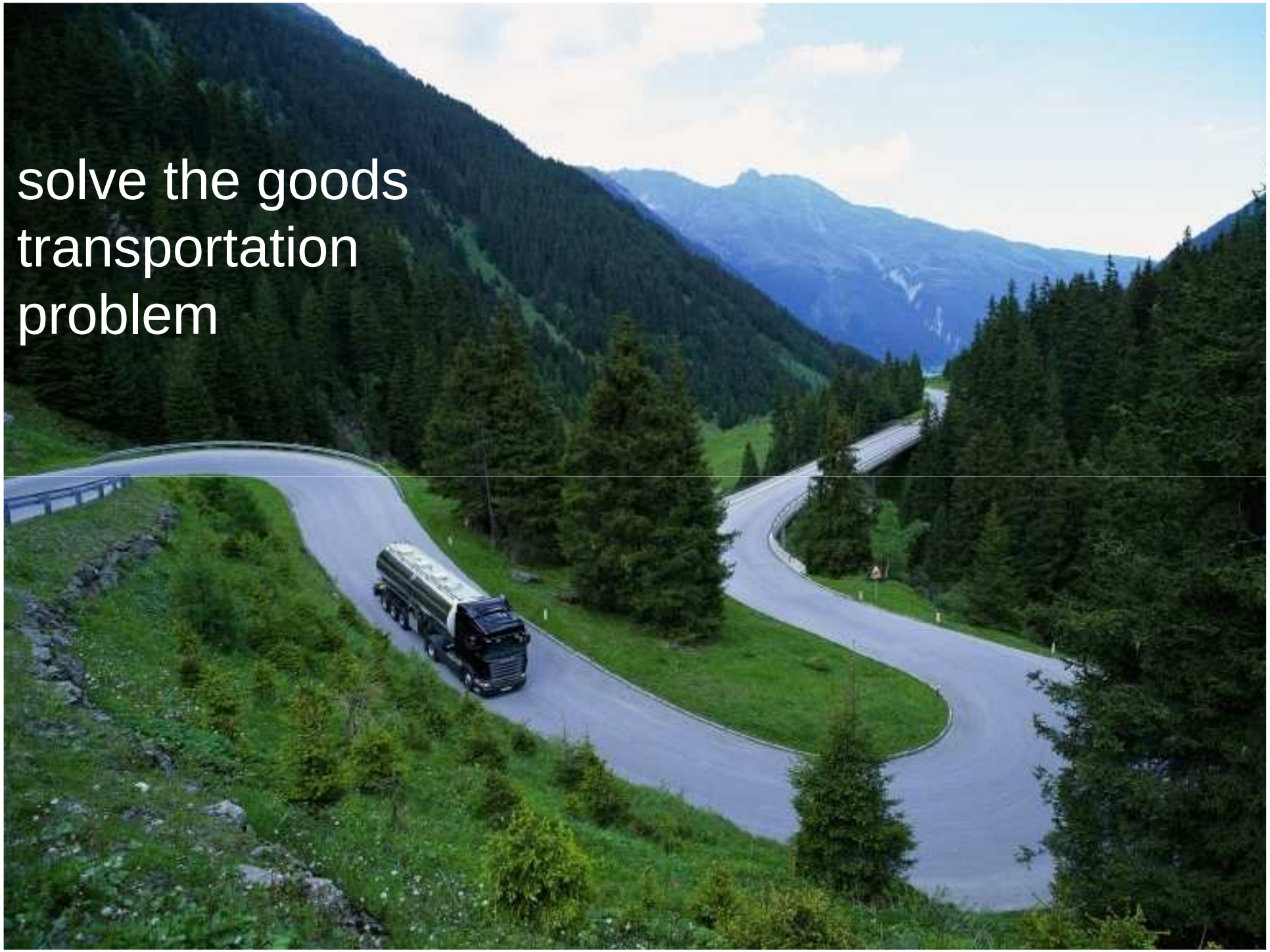
One view of real time data and information for automotive applications is that it they will help to solve the(X) people and goods movement problem by delivering up-to-the second awareness of exactly what is happening on the specific road on which an individual vehicle is travelling.

Another view is that they will (X) eliminate annoying breakdowns by delivering preventive maintenance warnings.

A third view is that they will (X) reduce the numbers and sizes of truck fleets by delivering up-to-the minute information about deliveries.


solve the people
movement
problem

solve the preventive maintenance problem


solve the goods
transportation
problem

How Real Time Data and Information will be the Differentiators in Telematics Related Products and Services

The Idea

My view is that more real-time data for travel and transport applications is a ***waste of time and money*** unless the data will be used by systems that can process it in real time to eliminate accidents and secondarily to eliminate pollution-causing, time wasting traffic congestion on the roads.

More real-time data is a ***waste of time and money*** unless it can be used directly by the vehicle.

More real-time data is a ***waste of time and money*** unless it can be used directly by the vehicle.

Real Time Data

This is a real time data processing machine. For the first million or so years of our existence, it has been the human brain that was responsible for the processing of real time data. It can hold a prodigious amount of data. The storage capacity of the brain in electronic terms is thought to be up to 1,000 terabytes. As a comparison, the National Archives of Britain, containing over 900 years of (his)tory, only takes up 70 terabytes.

Nerve impulses to and from the brain travel as fast as 270 kilometers per hour. But information travels at different speeds within different types of neurons and there are several different types of neurons within the body. Transmission along neurons can be as slow as 1.8 kilometers per hour, about the speed of a racing spider, or as fast 432 kilometers per hour.


real time data
processing machine

Real Time Data

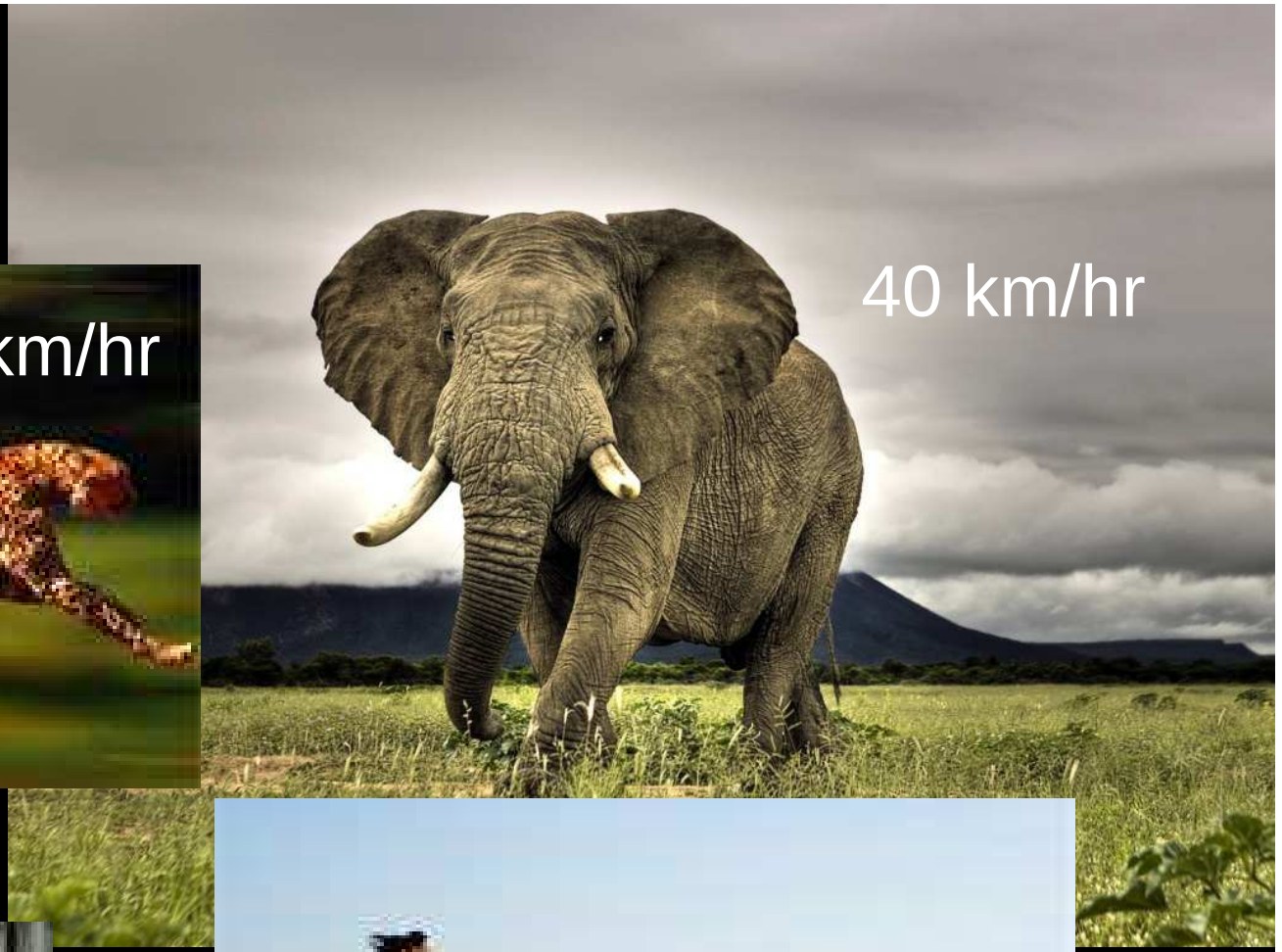
A cheetah can run at speeds up to 112 kilometers per hour, a lion is a bit slower at 80, and hunting dogs clocks speeds up to 72 kilometers per hour.

Normal humans can run at speeds of up to 32 kilometers, but we cannot do that for very long. (X) **As we all know**, Usain Bolt is not normal. He runs at a speed of over 40 km/hr. He could outrun an elephant in the first 100 meters, but would have to give up after the second.

We can outrun pigs and chickens and especially the giant tortoise, but our brains are not made to process data while we move at high speeds, no matter how clever you think you are with your video games. Try quieting your kids in the back seat, answering your mobile phone, turning down the radio and listening to navigation instructions while you play your next game of (X) Grid2 on your Xbox.

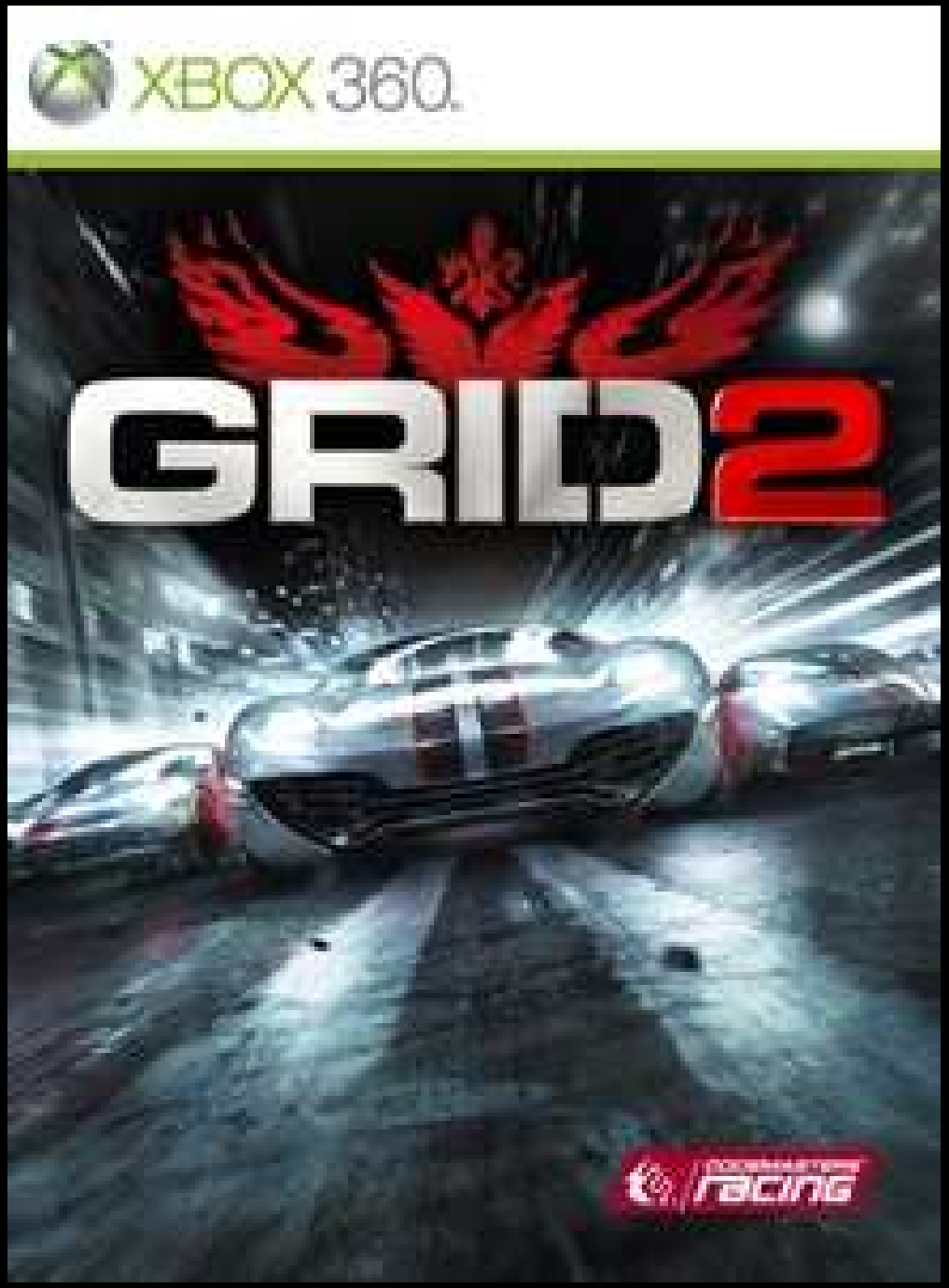
Let's admit it. We would not get very far very fast if we had to rely on our own two feet, which is why we invented cars and trucks and buses and trains and planes in the first place.


112 km/hr


40 km/hr


272 meters/hr


72 km/hr
32 km/hr


XBOX 360
GRID 2
racing

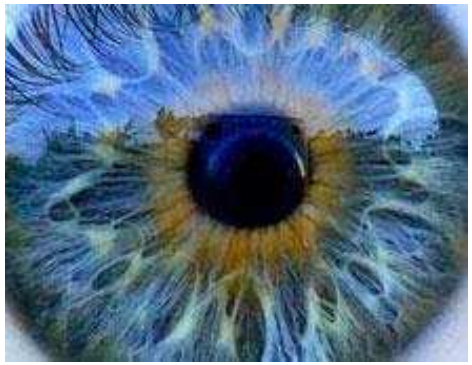
Real Time Data

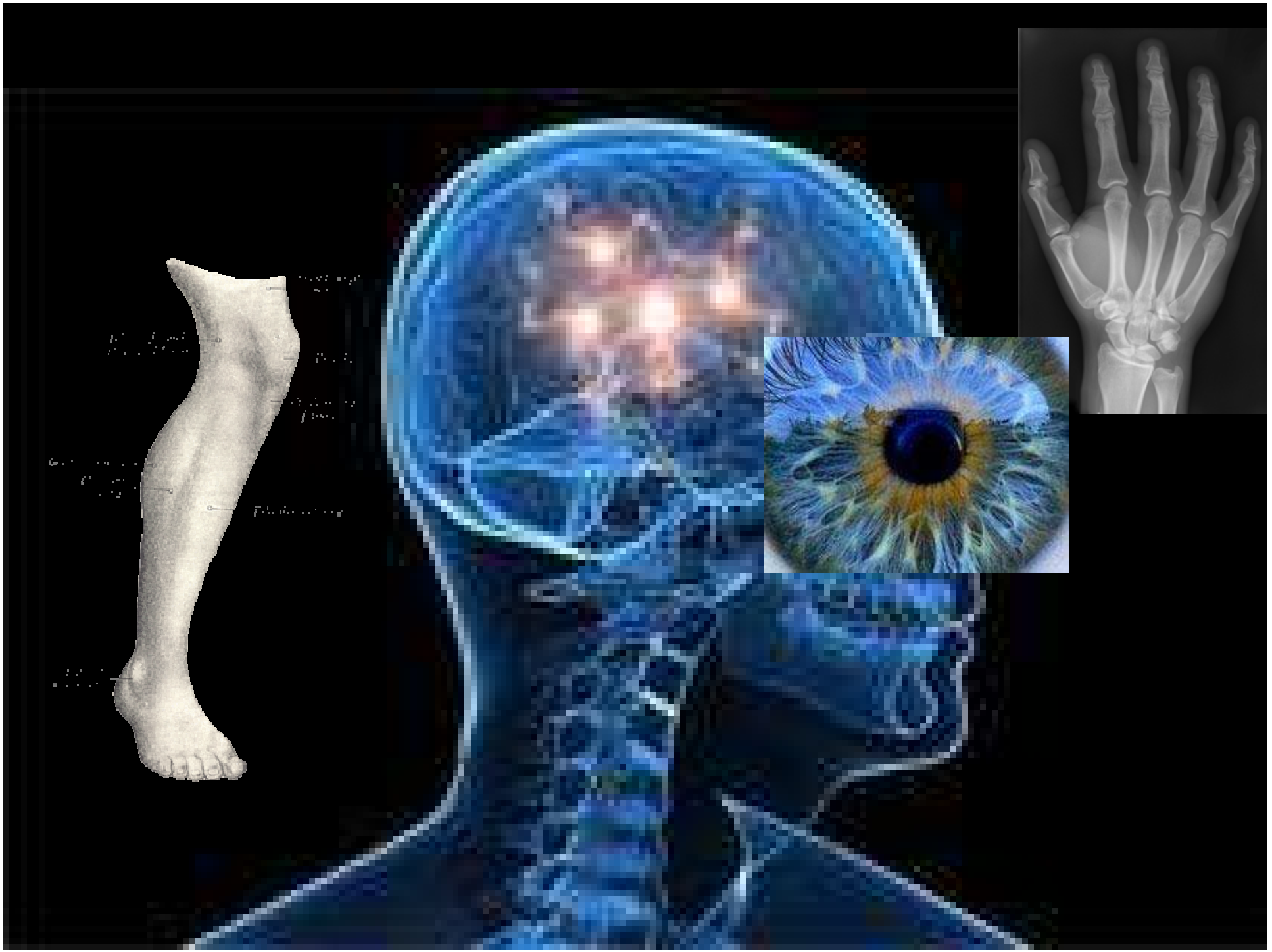
When it comes to driving, the hands and feet need to work quickly to act on what the mind is told that the eyes see—or think they see—and what the brain tells them to do.

In cars that exceed 32 kilometers per hour, a reasonable speed for city driving, actions must be executed while moving at speeds much faster than humans are made to function.

This execution is called response, and response time is the sum of reaction time—the eyes to mind and the signal to the hands and feet—plus movement time, which involves actually performing the task.

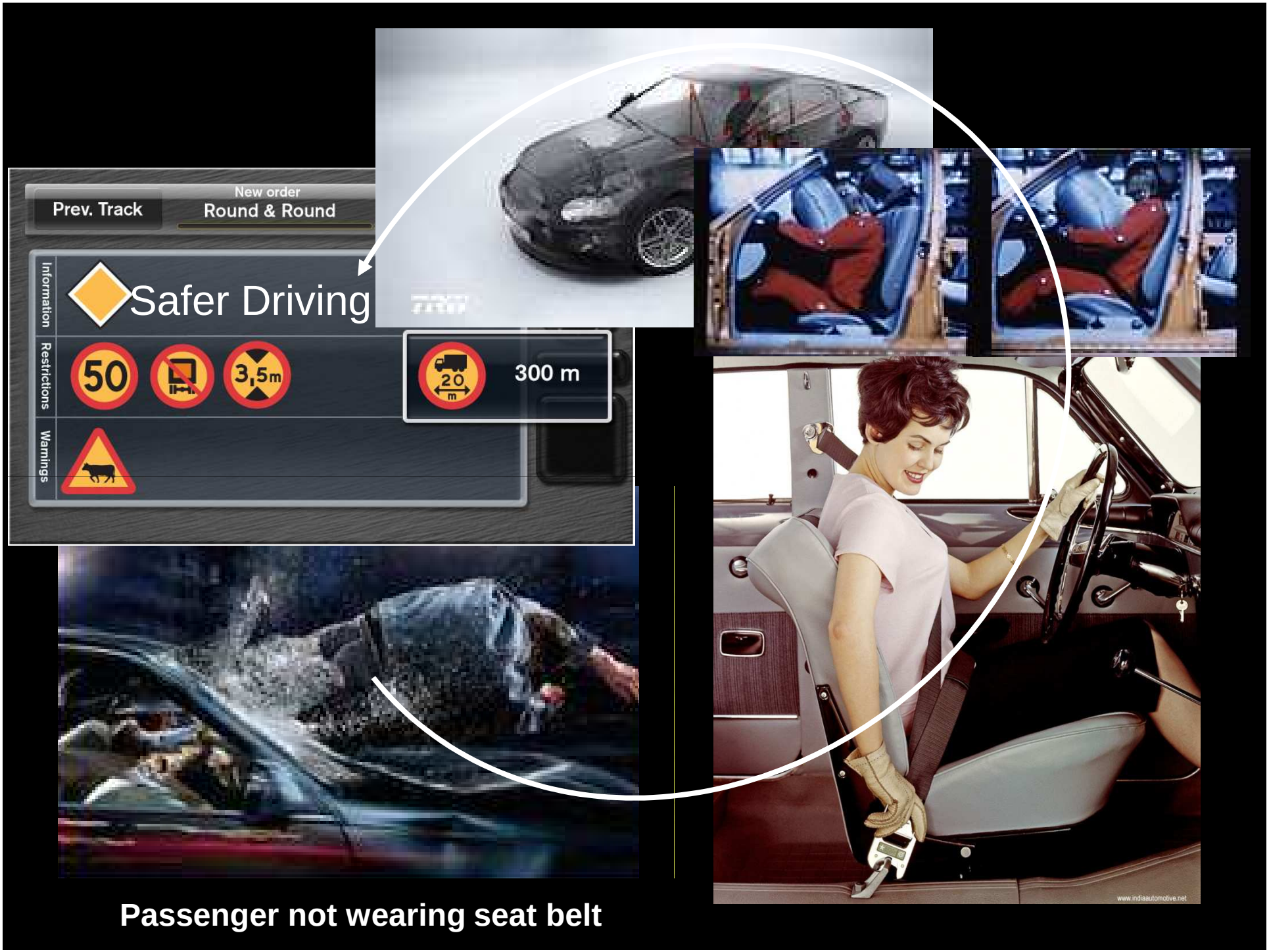
Driving is a complex activity and requires the most complex of reaction types, ‘discrimination reaction’. Response times are therefore longer than for simple reactions, like slapping your forehead when you feel like you are being bitten by a mosquito.





What is Real Time Data

We have made cars safer to protect us when the inevitable accident occurs, but until very recently, we have only been able to reduce mortality and serious injury, not the occurrence of accidents. Drivers have remained in control of the vehicle, and it is drivers who are the limiting factor in accident reduction.



Passenger not wearing seat belt

What is Real Time Data

We have demanded too much of our brains and bodies when it comes to driving. They are not up to the task. The World Heath Organization says that 1.2 million people die each year as a result of car accidents, and the vast majority of them—95%--are the result of human error.

That should be proof enough to accept that humans should not be driving cars at speeds that are faster than we can move ourselves.

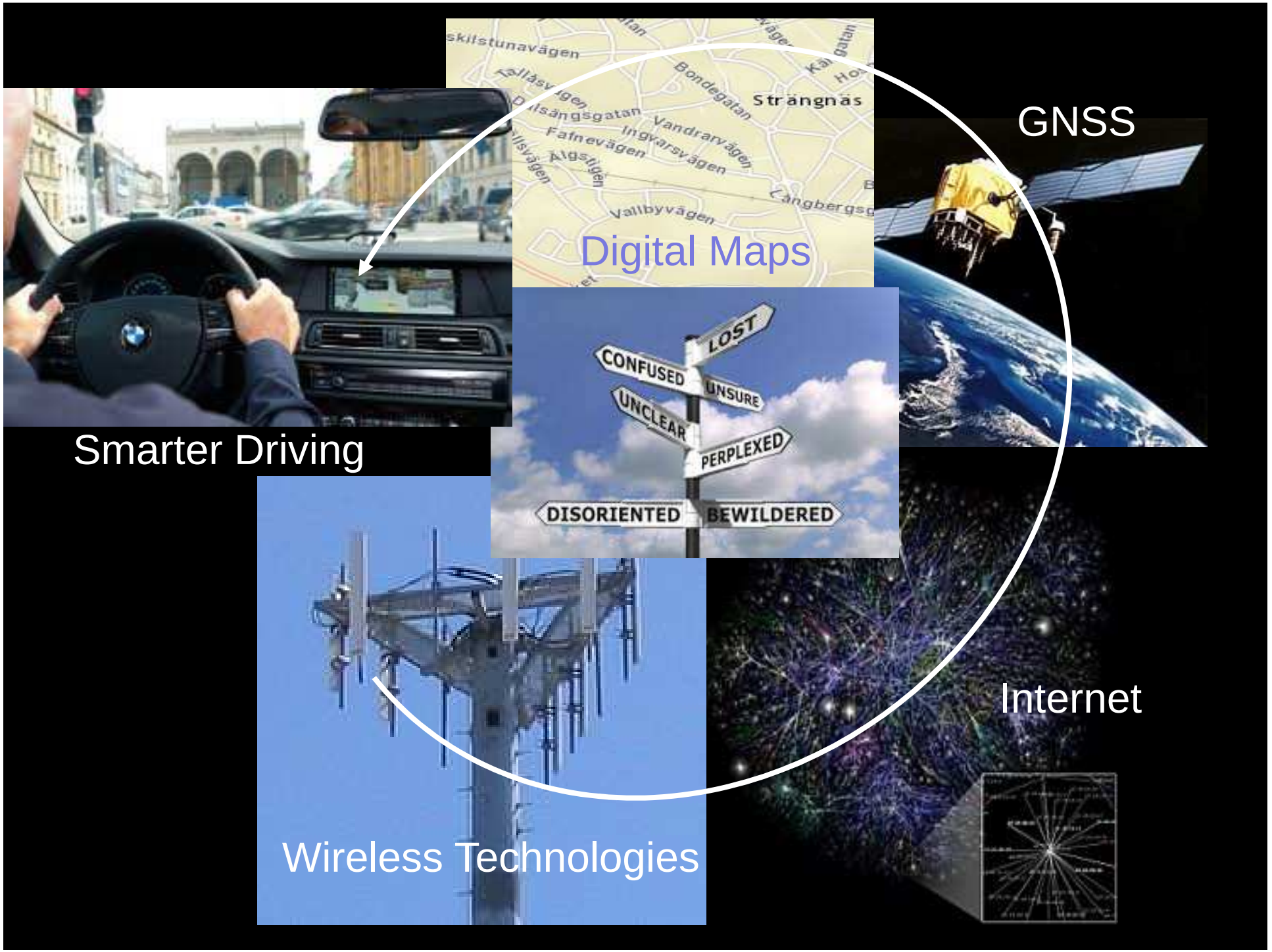
Source: Volkswagen Accident Research

What is Real Time Data

New technologies, like wireless communications, the Internet, the global positioning system, digital maps, have combined to help us to be smarter drivers, to get to where we need to go more quickly and more accurately.

GPS has increased safety and security by pinpointing the location of an accident or tracking a highjacked vehicle.

We may be less confused, less bewildered, less lost, or less disoriented, but we are still crashing into one another at unacceptable rates.

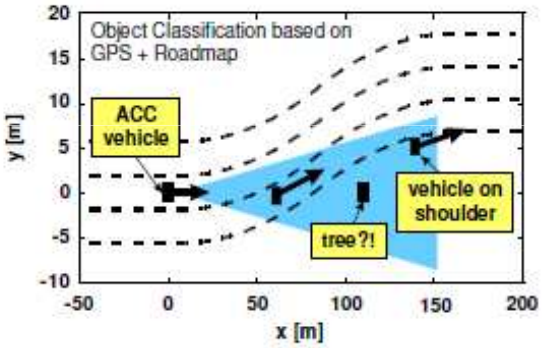

Digital Maps
GNSS
Smarter Driving
LOST
CONFUSED
UNSURE
UNCLEAR
PERPLEXED
DISORIENTED
BEWILDERED
Internet
Wireless Technologies

What is Real Time Data

There has been no shortage of computer processing power to substitute for our own brains, but what has been missing are the eyes that can see more than our own eyes, or even more than 360 degree camera eyes fitted to our vehicles.

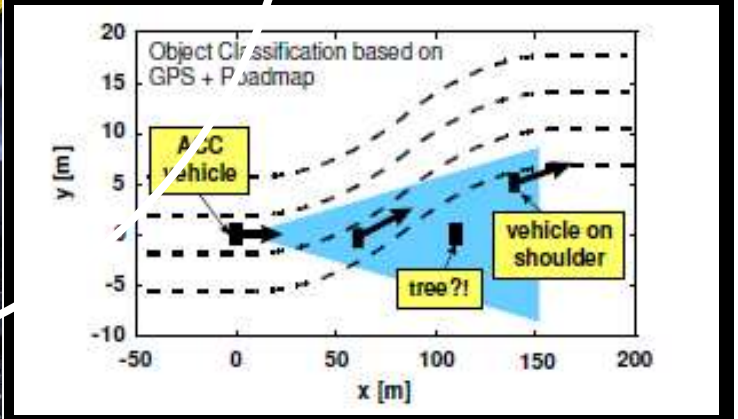
Eyes that will see what is happening around us as we drive, and not just what is visible but what is around corners and over the hills. Not just a few hundred meters ahead, but several kilometers.

Advanced Driver Assistance Systems (ADAS) employ what is called an Electronic Horizon, which is a digital map of the road ahead with information that extends beyond the visible road. Adding cameras to work as the eyes for the computers is now allowing us to take the next logical step in improving driving safety: taking the principal cause of failure out of the equation: Us.



Stand-alone Telematics

ADAS

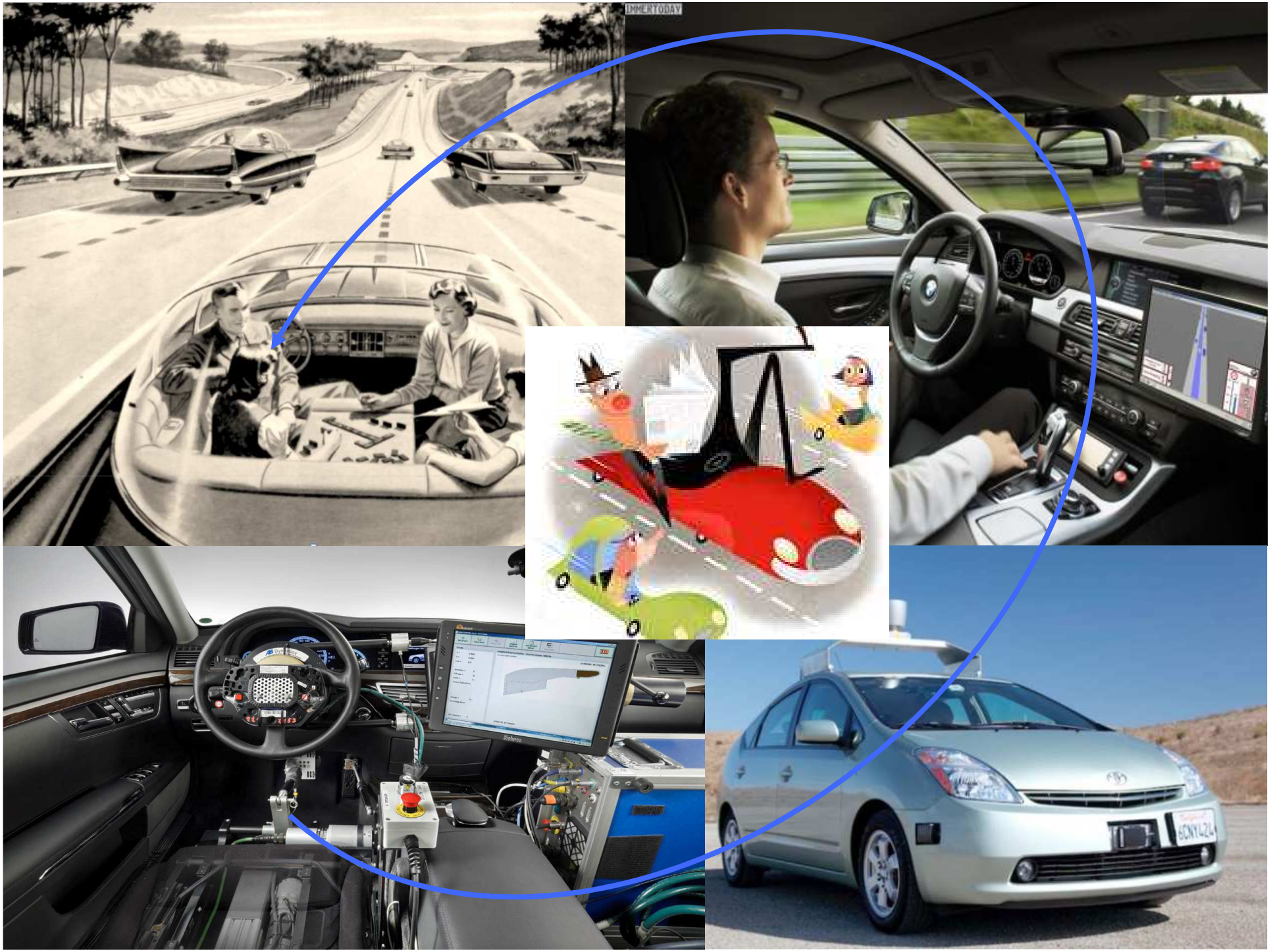


Connected Navigation

What is Real Time Data

Real time data will allow us to take the next logical step in moving at high speeds on the ground: Turn the driving over to systems that can act on real time data at real time driving speeds:

- with eyes that don’t close or get distracted;
- hands that are not taken off the wheel to regulate the air conditioning or take a sip of coffee,
- feet that aren’t connected to arthritic knees and hips.
- and a mind that is not thinking about something totally different from what the eyes are seeing in front and around the moving vehicle.



Think of a vehicle as a robot that follows the three laws of robotics defined by the great visionary, Isaac Asimov.

This is not Fantasy Land.

Airplanes have been piloting themselves for years. Planes take off, fly and land themselves without the slightest need for the hands of a pilot. Autopilots in modern complex aircraft generally divide a flight into taxiing on the ground, takeoff, ascent, cruise, descent, approach, and landing phases. Autopilots exist that automate all of these flight phases except the taxiing.

Ships crisscross the oceans without a steersman ever touching the helm.

Why not cars and trucks and busses and all types of vehicles that currently run on roads?

- Vehicles that fix their own problems;
- Vehicles that fuel themselves;
- Vehicles that park themselves; and,
- Vehicles that drive themselves.

The Three Laws of Robotics

1. A Car may not injure a human being or, through inaction, allow a human being to come to harm.
2. A Car must obey the orders given to it by human beings, except where such orders would conflict with the First Law.
3. A Car must protect its own existence as long as such protection does not conflict with the First or Second Law.


Car: Park thyself
AUTONOMOUS PARKING
TEST VEHICLE
360
Car: Heal thyself
AUTONOMOUS DRIVE
Car: Drive thyself
Car: Fuel thyself

There are obstacles, which means we will not get there overnight:

The Vienna Convention on Road Traffic is one of the major obstacles. It was signed into international law in 1968.

Article 8: Drivers

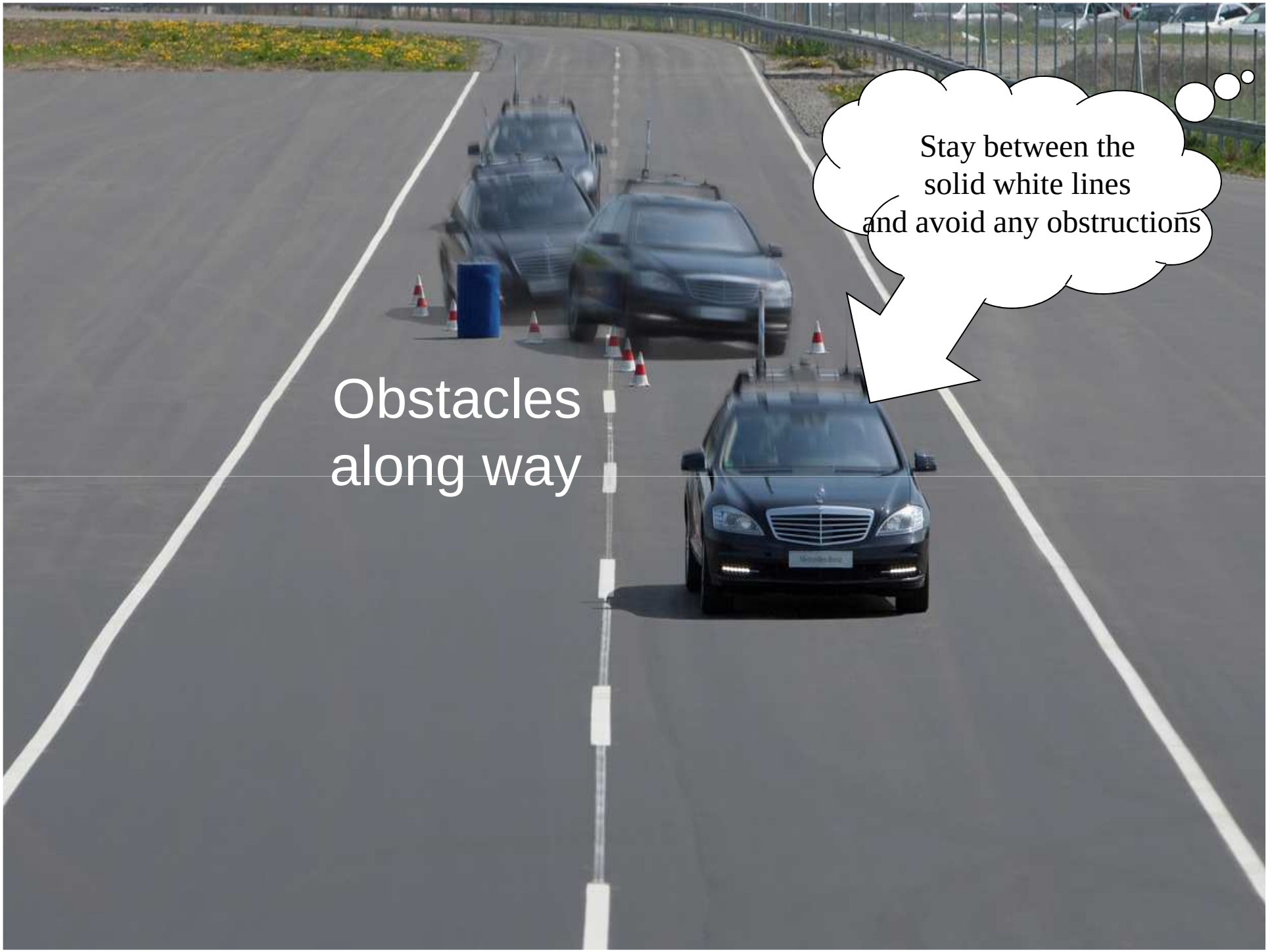
ARTICLE 8.1: "Every moving vehicle or combination of vehicles shall have a driver."—although it does not say the driver has to be in the car or that the driver must be driving.

ARTICLE 8.5: "Every driver shall at all times be able to control ((his))"--the but the driver can tell the car what to do without being at the wheel.

Article 13: Speed and distance between vehicles

ARTICLE 13.1: "Every driver of a vehicle shall in all circumstances have (his) vehicle under control so as to be able to exercise due and proper care and to be at all times in a position to perform all manoeuvres required of him. (He) shall pay constant regard to the circumstances in particular the lie of the land, the state of the road, the condition and load of (his) vehicle, the weather conditions and the density of traffic, so as to be able to stop (his) vehicle within (his) range of forward vision and short of any foreseeable obstruction.

…and the fact that it so difficult to do all of these tasks at the same time that we have so many accidents..


Stay between the
solid white lines
and avoid any obstructions
Obstacles
along way

What is Real Time Data

Vienna Convention on Road Traffic

- The Vienna Convention contains some limited openings, and it can be changed. A change was made in 2006) when the following addition to Article 8 was made:

  "The driver should minimize any activity other than driving".

- Some exemptions have been made for domestic purposes, for example:
  - (c) Vehicles used for experiments whose purpose is to keep up with technical progress and improve road safety;
  - (d) Vehicles of a special form or type, or which are used for particular purposes under special conditions".

In the end, if we need to, we will have to change the regulations because there is steady and determined progress being made in automated and autonomous driving. This is a current view of the timeline of the march toward fully autonomous vehicles.


>2025
FULLY AUTOMATED
Monitoring of the system not required
Driver does not need to be able to take over the driving task
Example: Highway driving up to 130 km/h
2020
HIGHLY AUTOMATED
Monitoring of the system not required
Driver needs to be able to take over the driving task with lead time
Example: Stop-and-go (highway)
2016
PARTIALLY AUTOMATED
Monitoring of the system required
Driver needs to be able to take over the driving task at any moment
Example: Stop-and-go up to 30 km/h

What is Real Time Data

Minerva's owl begins to fly at dusk.

This was philosopher Georg Hegel's way of saying that wisdom comes only with hindsight.

Well, friends, this is hindsight. It is already dusk for the developments I have spoken about. Real time data is here. Partially automated systems are on the roads. Autonomous vehicles have already registered more than half a million kilometers, thanks mainly to Google.

We have wasted enough time on using real time data to sell hamburgers and jeans. We have wasted enough storage space on photos of ourselves looking cute or foolish.

It is now time to focus our efforts on the data and the systems that will produce truly useful results, to eliminate accidents and road congestion.

Minerva‘s owl begins to fly at dusk

Hegel


Michael L. Sena
10 September 2013