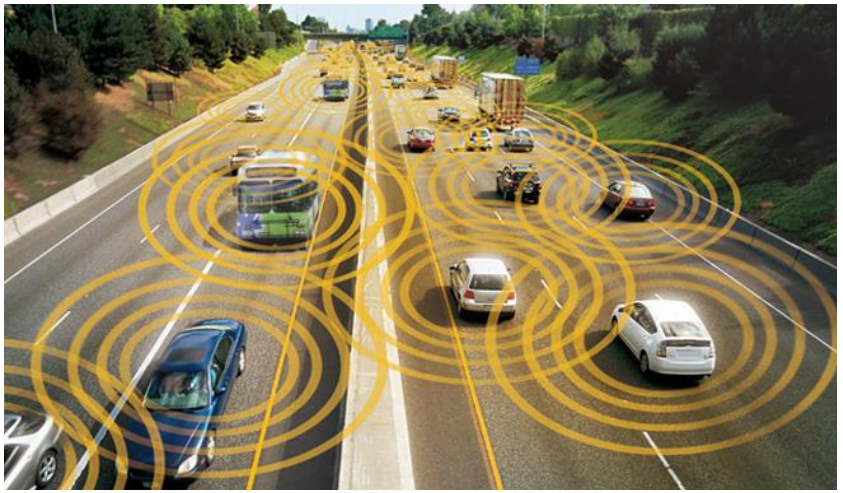
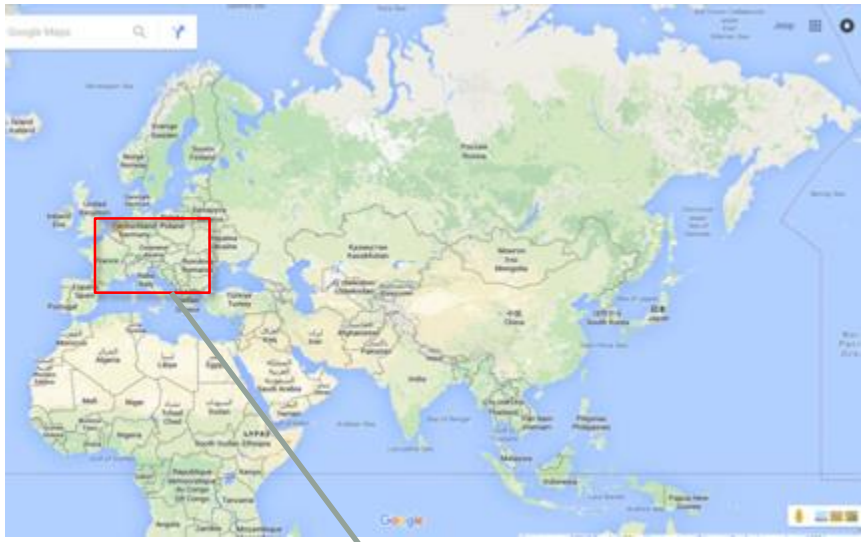
今日はあなたに話が出来て光栄です

ing. Joop Veenis
Information- & Knowledgemanagement
Innovation- & Changemanagement
Consultant & Manager
Veenis Professional Services BV
The Netherlands

www.veenis.net
joop@veenis.net



Joop Veenis, I come from “Lisse”



NetherLands
NL

I COME FROM
A TOWN “LISSE”
NEAR AMSTERDAM

THIS IS THE FLOWER
BULB AREA WITH
TULIP FIELDS AND
KEUKENHOF GARDEN
VISITED MOST IN SPRING

My personal ambition: I would like to arrange a testdrive in the tulip fields with selfdriving vehicles! Made in Japan ?

- https://youtu.be/rHqKcyShlbo

NL: ambitious people to work for…

Netherlands test country for self-driving vehicles

Learning by doing is a key ingredient

Minister Schultz- van Haegen and King Willem-Alexander in a

- Testing on public roads is allowed
- Well-maintained + intensively used infrastructure
- Nationwide 4G coverage + detailed maps
- Innovative traffic control center
- Innovative and logistics sector
- Experienced in learning by doing

Tests in NL on public roads: Platooning trucks and hospitallity shuttle

2015: on public road NL.
2016: on corridor in EU.

Wepod: Hospitality shuttle EZ10
25 km/hour from Ede train station to Wageningen Life Science Center

My work at DOT: knowledge sharing

Digital sharing:

Research documents, presentations, Video etc.
Dropbox Professional; just join!
Googlesheets documents
Catalog
Interactive website(s), KAR, DITCM

Face-to-Face (share&create):

Connecting professionals
Workshops
Knowlegde inventory
Research agenda
Scenario’s for the future

A few short topics

- C-ITS Corridor current development and beyond
- Joint Architecture development
- Security and EU Trustmodel
- Conclusions and food for thoughts

Common goals:
Realise smooth and safe road traffic with (ITS) technology that can be used with peace of mind!

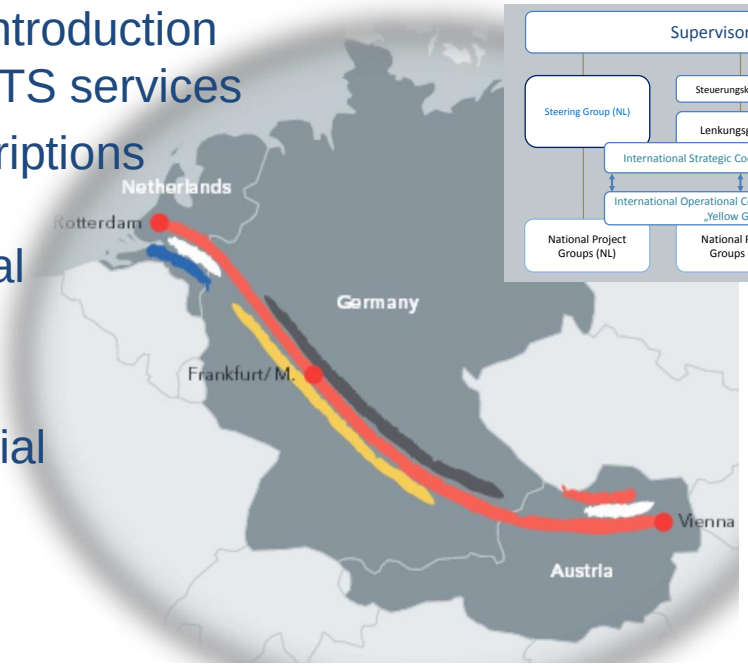
Cooperative ITS joint development

The corridor NL-DE-AT

Cooperative ITS Corridor
Joint deployment

Providing a basis for standardized, international, future-oriented cooperative ITS services:

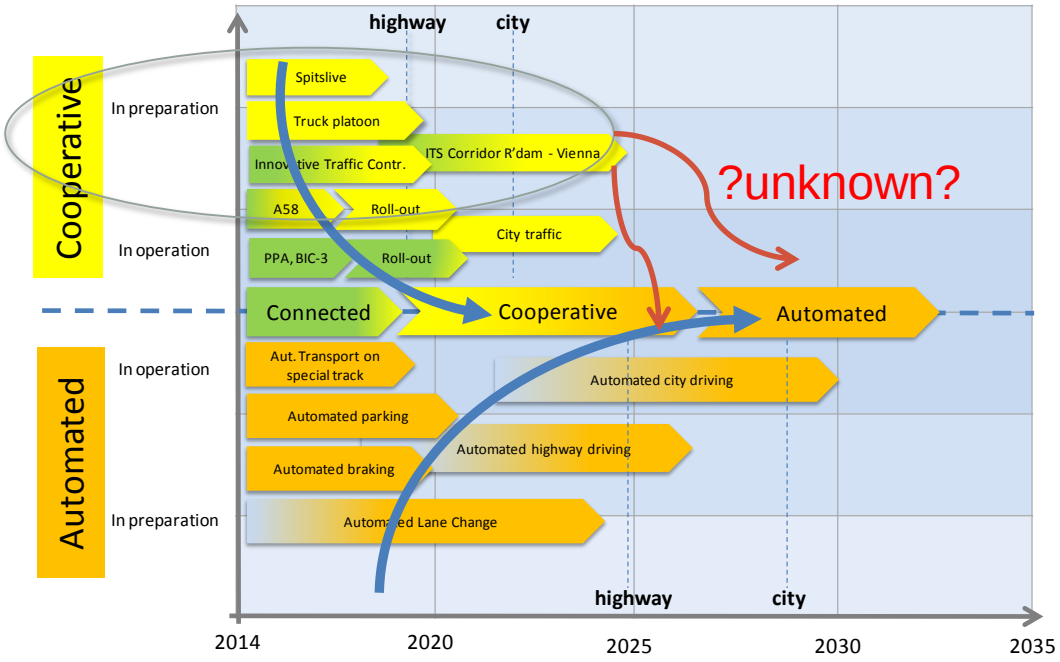
- A joint road map for the introduction of the initial cooperative ITS services
- Common functional descriptions of the initial cooperative ITS services and technical specifications
- Start of the actual implementation of the initial cooperative ITS services



Initiated by road authority's Traffic Management opportunity's

Not designed with ‘autonomous’ in mind

The ITS Corridor is for Coöperatieve V2X.
It is not designed with Autonomous vehicles In mind.



informed → *cooperative* → *automated and cooperative*

Initiated by industry: New business opportunity's

ITS2015 shows a mix of connected, cooperative and autonomous systems

The C-ITS communications, which offer a new source of information, use data transmitted by other vehicles to enhance awareness of the vehicle's surrounding environment.

1. Example Car-2-Car pedestrian warning

2. Example use cases when carmakers cooperate with road operators:

SCOOP@F project demonstrated on the Bordeaux ring road by **PSA Peugeot Citroën** and the **Interdepartmental Directorate Aquitaine Roads**.

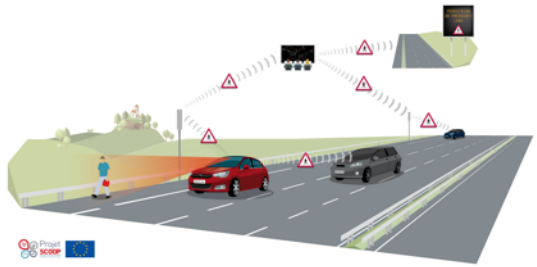
This project illustrates how carmakers and road infrastructure operators are cooperating to develop C-ITS.

Three use cases:
Pedestrian on the side of the road, **roadworks** and **broken down vehicle**.

The following communication methods are being illustrated:

- Car-to-Infrastructure.
- Infrastructure-to-Traffic Management Centre.
- Infrastructure-to-Car.

The car presented is one of the **1,110 PSA Peugeot Citroën** vehicles that will be fitted with the SCOOP@F system from 2016 as part of a large-scale experiment to be conducted **in five regions across France on 2,500km of roads equipped with the requisite technology**.



3. France Showcase autonomous driving:
580 miles
from Paris to Bordeaux
Highway autopilot
Sensing, Breaking, Stearing, Overtaking!

Autonomous vehicles - Level 3

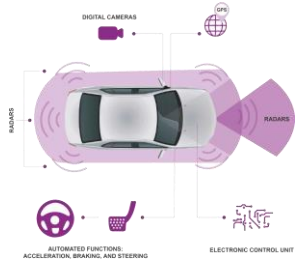
«Autonomous driving in traffic jams and in the fast lane without driver involvement»

The vehicle self-drives on suitable roads —separeted lane road — in all traffic conditions (traffic jams, slow moving traffic, etc.).

How does it work?

Combining data using prototype sensors (laser scanner, multifunction cameras, radars, GPS) means:

- Speed is adapted to the surrounding environment, taking into account the presence of other vehicles, road infrastructure and the applicable speed limit.
- Lane tracking and high-precision GPS route tracking guide the vehicle's steering.
- The vehicle can change lanes automatically including for overtaking, pulling back in, etc.



Challenges:

The C-ITS communications, which offer a new source of information, use data transmitted by other vehicles to enhance awareness of the vehicle's surrounding environment.

Inter operability

Autonomous vehicles - Level 3

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Safe software

SCOOP@F project demonstrated on the Bordeaux ring road by **PSA Peugeot Citroën** and the **Interdepartmental Directorate Aquitaine Roads**.

This project illustrates how carmakers and road infrastructure operators are cooperating to develop C-ITS.

Three use cases:
Pedestrian on the side of the road, roadworks and **broken down vehicle.**

The following communication methods are being illustrated:

- Infrastructure-Ca

The car presented is one of the **1,110 PSA Peugeot Citroën** vehicles that will be fitted with the SCOOP@F system from 2016 as part of a large-scale experiment to be conducted **in five regions across France on 2,500km of roads equipped with the requisite technology.**

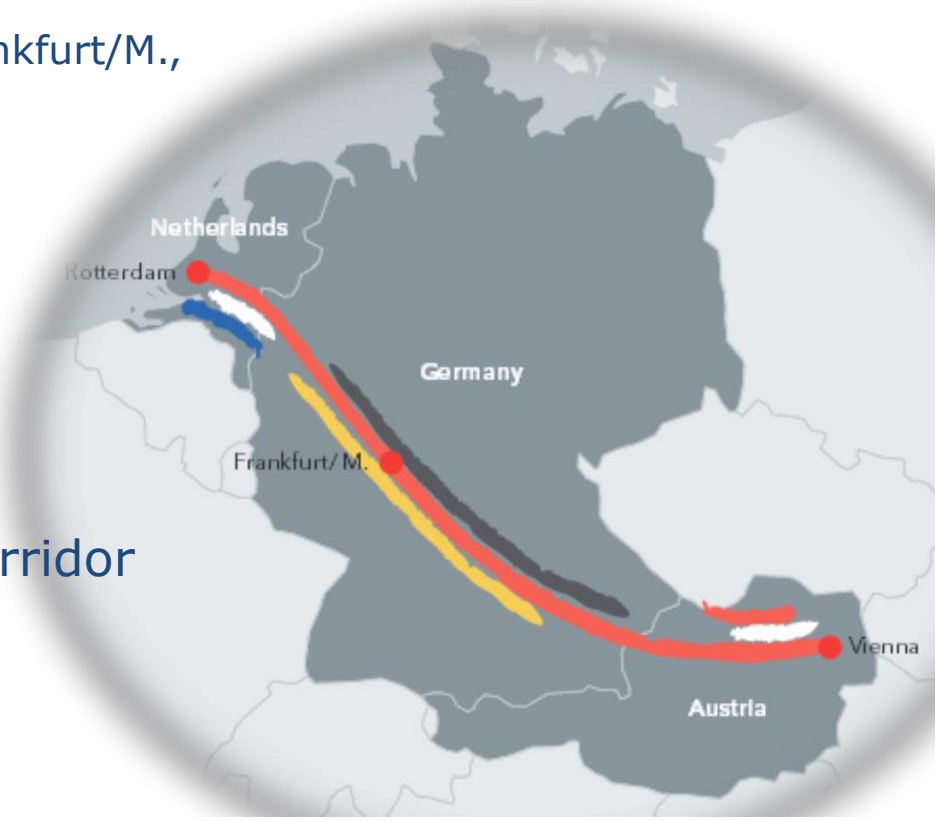
Privacy

C-ITS Corridor has 3 phases and takes a step by step deployment

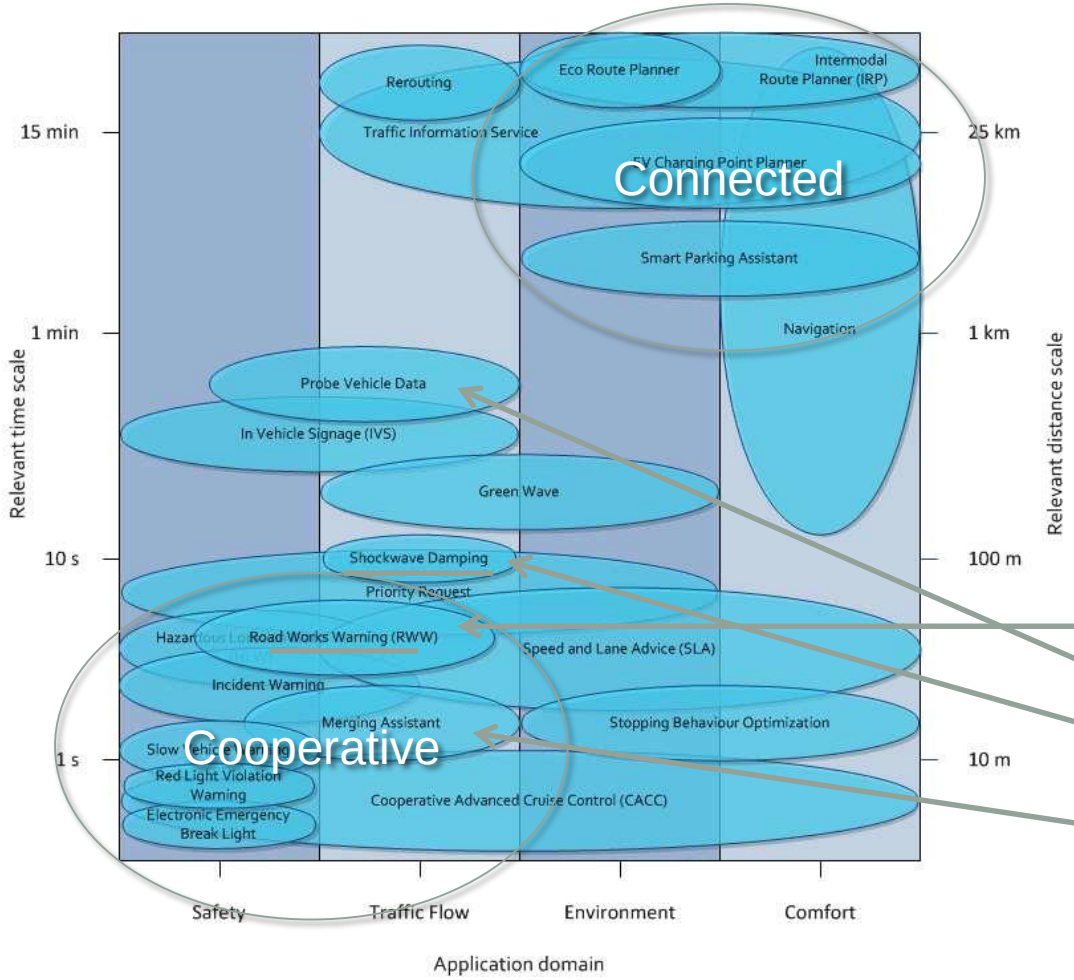
1. Pre-development and proof-of-concept
   - with road works safety trailers in Hesse around Frankfurt/M.,
   - within the Austrian project ECO-AT, and
   - by extension of Dutch Test-site DITCM

2. Deployment of Road Works Warning and Probe Vehicle Data in the Cooperative ITS Corridor (NL – DE – AT)

3. Nationwide deployment



C-ITS applications selection on a time/distance scale



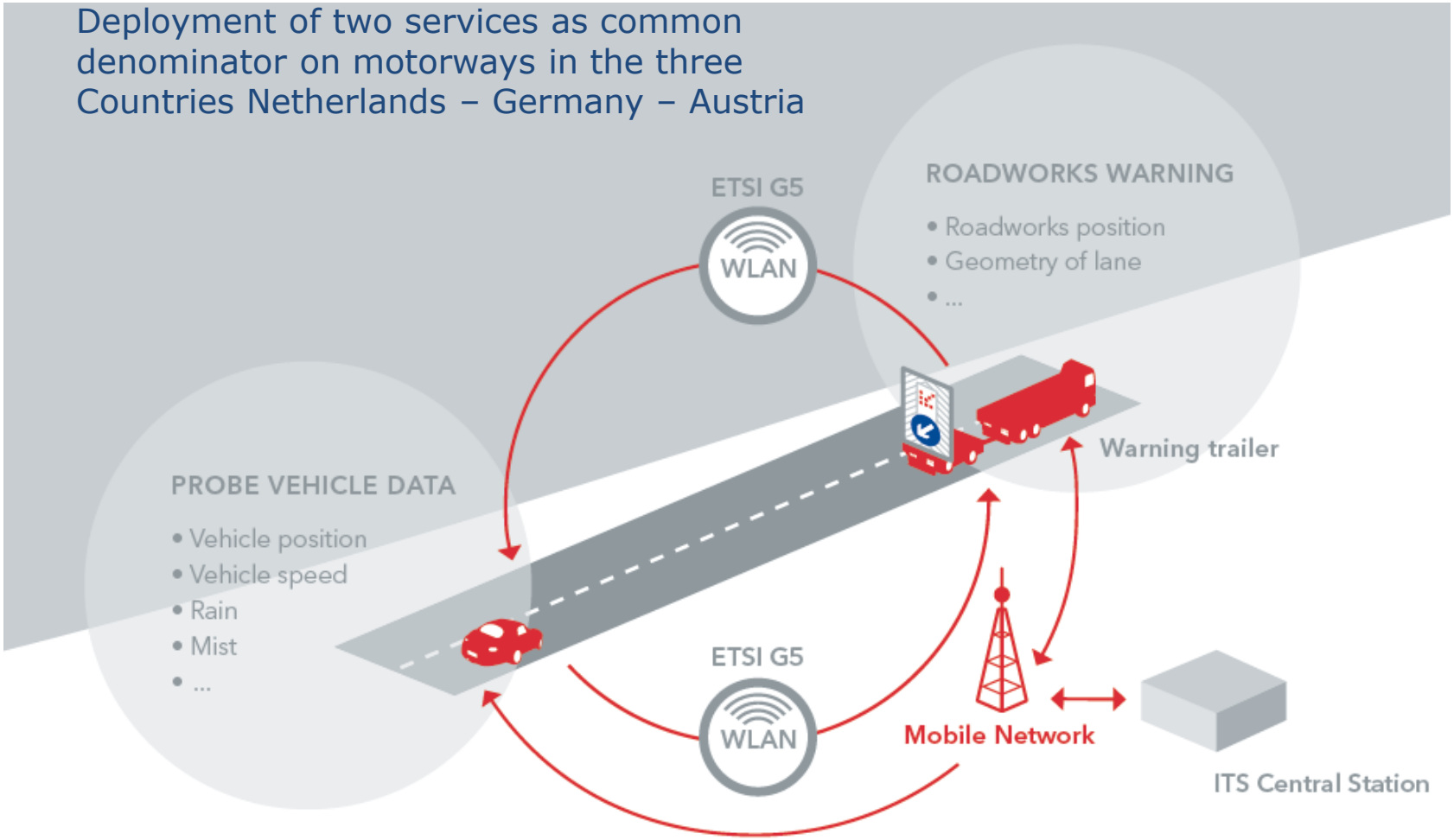
Safety-related applications are the first ITS-G5 applications in deployment.

RWW
PVD
Shockwave
Merging a platoon

Figure 2-1 C-ITS applications per application area and time/distance scale [from DITCM 1.0]

RWW and PVD tested in 3 countries

Deployment of two services as common denominator on motorways in the three Countries Netherlands – Germany – Austria



Evaluation of RWW includes the human factors

- Is RWW improving the drivers comfort ?
- Is RWW improving the sense of safety of the driver ?
- Is RWW improving the sense of control of the driver ?
- Is RWW improving if the drivers attention ?
- How often does the driver use RWW?
- How does the driver react to RWW ?
- Under what circumstances does the driver bennefit most?
- How is RWW's timing ?
- Is RWW usabel, reliable, credible?
- Does the driver allow to share his profling data ?
- Does the driver feel that his privacy is being respected ?
- Does RWW provide the information the driver needs ?

Human Factors require attention.
As long as there is a driver in the vehicle.

Dutch test highway A58 Shockwave reduction to improve traffic flow

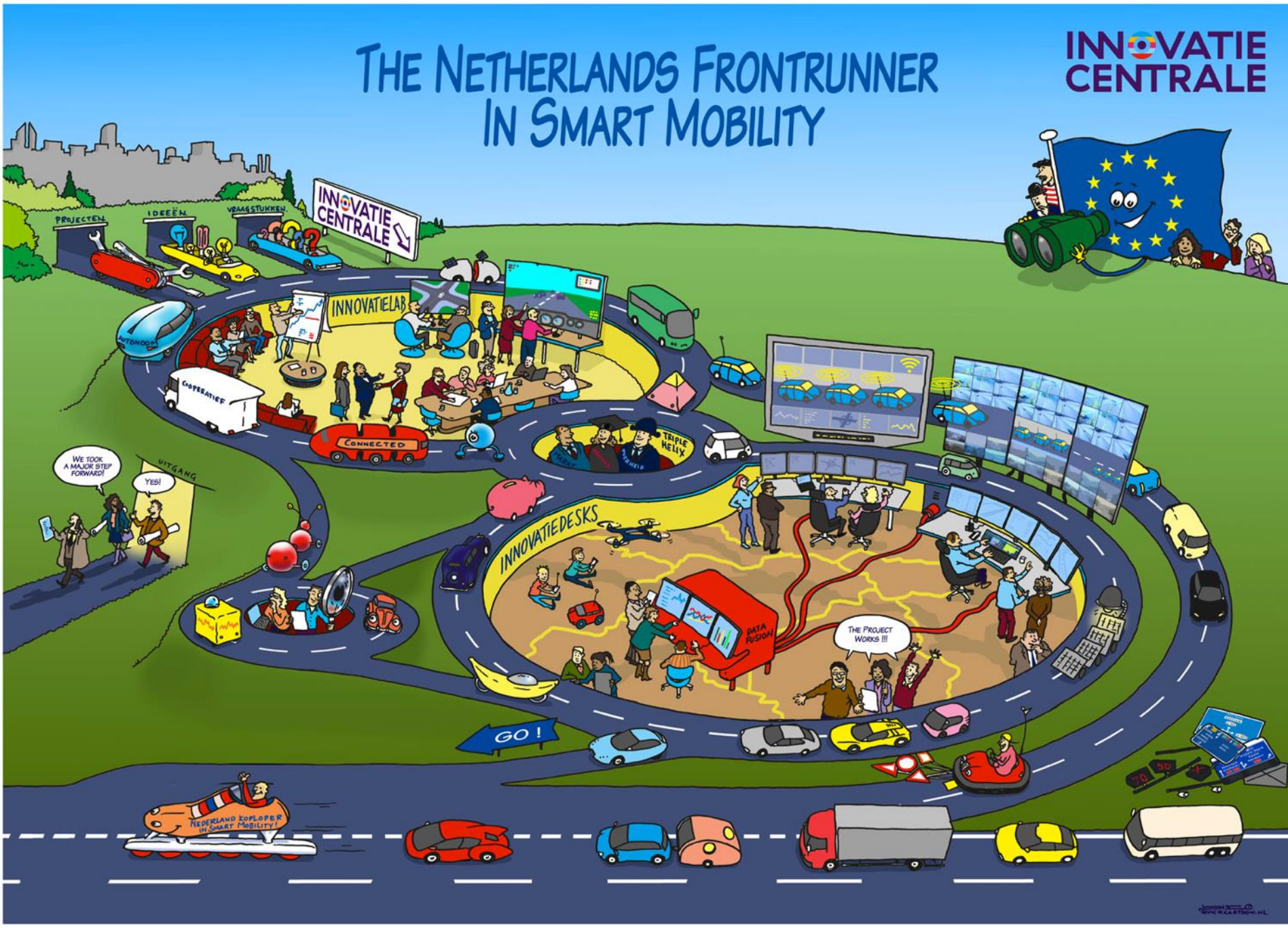
- Take the problem caused by a car that suddenly brakes in front, forcing you to brake a few seconds later, and so on down the line of cars behind you.
- The resulting shock wave, as it's called, may even gain in amplitude and finally form a standing wave. The result is a long-lived traffic jam at some random spot.
- On A58 40% of traffic jam is coursed by this.
- "You can stop it," Gwen Van Vugt says, "by telling people a mile or more behind me to reduce their speed, for example dropping from 100 miles per hour to 80. It completely dampens the shock wave—we've proven it with 100 vehicles, in Helmond."
- Now operational on 17 km highway.
- One thing learned is that you need just a small number of talking cars to improve the flow of traffic.
- That particular service, he says, is more important to road managers in the Netherlands than to their counterparts in Germany. But though national priorities may differ, base stations will always work across borders.

Grand Cooperative Driving Challenge 2016

- The GCDC 2016 will be the second edition of the Grand Cooperative Driving Challenge. The first GCDC was held in May 2011 in Helmond, the Netherlands.

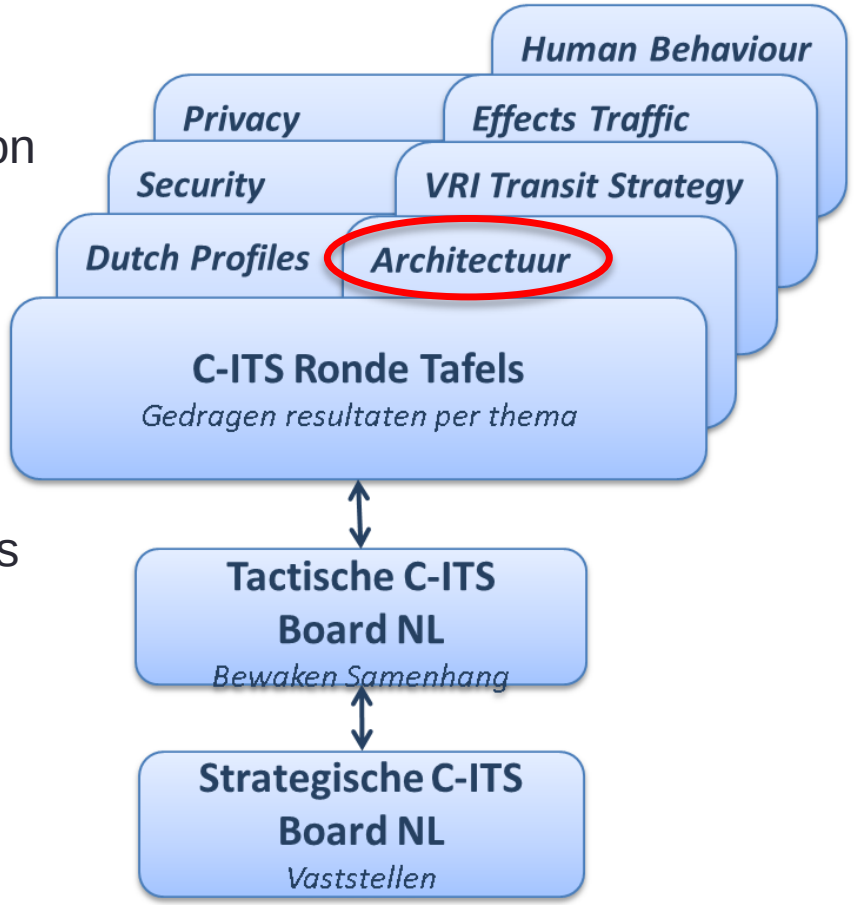
- The GCDC 2011 was mainly focused on the ability to perform longitudinal control of the vehicles (platooning). In the 2016 edition addition of lateral control (steering) will take cooperative driving to a new level. Challenges awaiting the participants include, for example:

- **Ability to merge platoons and to join a busy road on a T intersection without driver intervention.**
- **Overtake and merge: competing technologies or complementary (C-ITS versus autonomous techniques).**


THE NETHERLANDS FRONTRUNNER IN SMART MOBILITY
INNOVATIE CENTRALE
PROJECTEN
IDEEËN
VRAAGSTUKKEN
INNOVATIE CENTRALE
INNOVATIELAB
AUTONOOM
COOPERATIEF
CONNECTED
TRIPLE HELIX
WE TOOK A MAJOR STEP FORWARD!
YES!
UITGANG
INNOVATIEDESKS
DATA FUSION
THE PROJECT WORKS !!!
GO !
NEDERLAND KOPLOPER IN SMART MOBILITY!

NL organizes expertgroups and knowledge tables (EU-alligned)

Knowledge Sharing on Automated driving, Connected and Cooperative Systems
Is combined in Knowledge Tables, where experts Meet from:
Government,
Automotive
Insurance
Users
Etc.



Communication Reference Architecture and Dutch Profile for RWW service

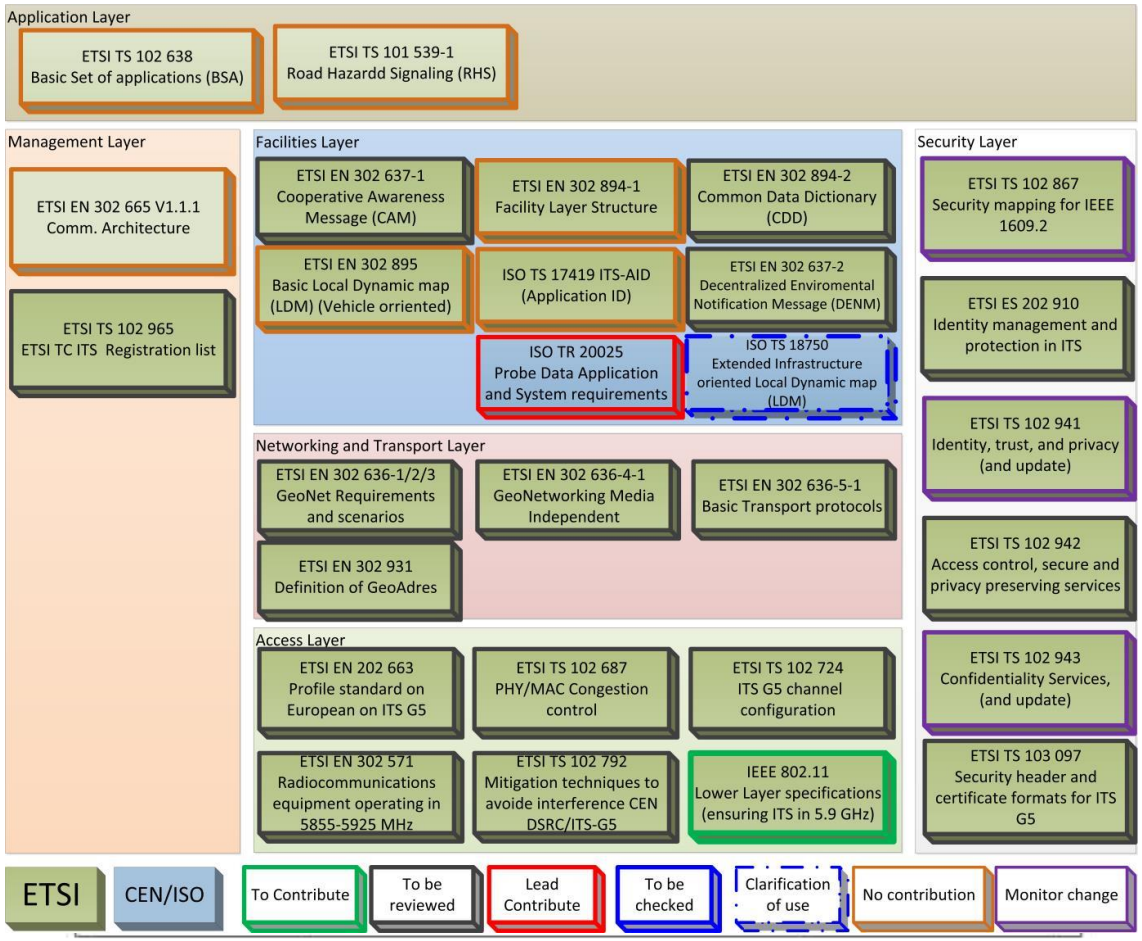


FIGURE 6.2 MINIMUM SET OF STANDARDS FOR DEPLOYMENT OF RWW AND PVD

Figure 4-8 ITS station reference architecture / ITS-S host with examples of possible elements

This reference communication architecture is valid for all ITS systems, i.e.
OBU, RSU and BO systems.
In the ETSI definitions these elements are named Vehicle ITS, Roadside ITS and Central ITS.

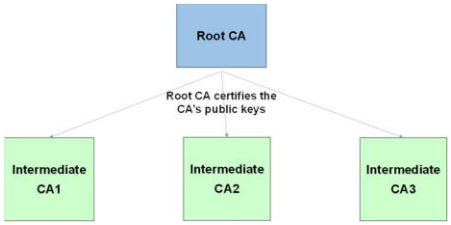
Security goals

- Integrity
  - Authenticity
  - CAM + DENM Messages
  - Key Management
- Confidentially
  - Key Management
  - Privacy
  - Resolving the relation between pseudonyms and vehicle owner/driver shall be prevented for unauthorized entities
- Availability
  - In time
  - always

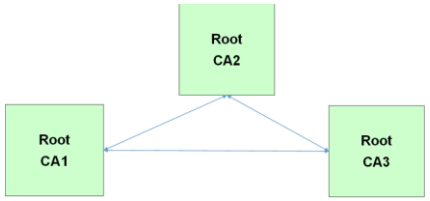
Traffic Safety relies on reliable and secure information, which in turn demands for a dedicated system that provides tools to establish trust between communication end-points.

WG Recommendation for PKI trustmodel

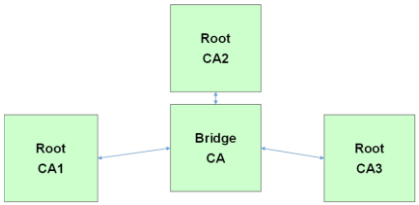
- Deploy one common trust model for whole EU
  - Day One:
    - single trust domain (let op ≠ one single Root CA)
    - Certificate Trust List (optie 2c)
  - Toekomst:
    - multiple interoperable trust domains
    - CTL in multi-domains (optie 3c) *of* Bridge CA in multi-domains (optie 3b)



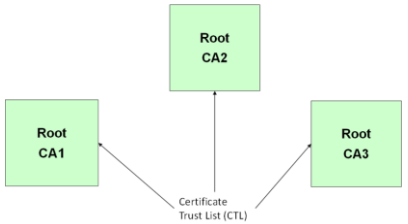
1. Hierarchisch



2/3 a. Federation



2/3 b. Bridge CA

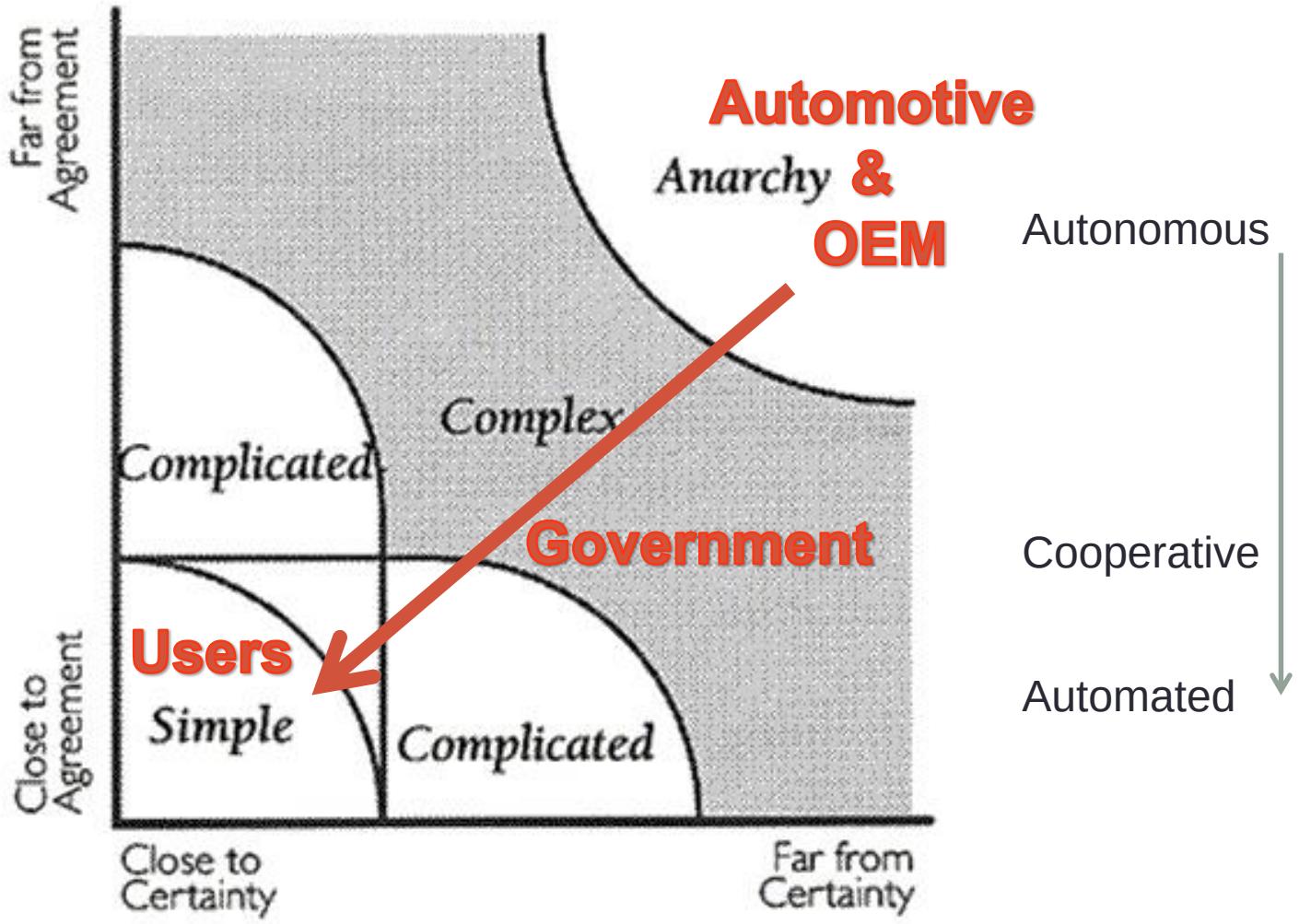


2/3 c. CTL

Technology is not the biggest challenge

- Break down legal barriers and stimulate innovation
- Provide the (digital) infrastructure
- Safety and security
- Gain and maintain public support

Work together towards simple solutions



Conclusions and food for thought

- Work is in progress; from connected, cooperative AND autonomous to fully automated vehicle's. Will developments converge and prove their functional synergy ?
- ITS Corridor improves smart traffic management and coordination on standards and privacy issue's.
- Meanwhile autonomous cars are being tested in several countries in Europe: NL, UK, FR, DE, Sweden. Including overtaking and merging using (just) sensors (and HD-maps).
- Meanwhile most C-ITS use-cases are still in pilot or operational in a small area and will not be available soon on all public roads.
- Need to speed up deployment of C-ITS in all countries in EU.
- Progress is now achieved via real live projects to share knowledge and where stakeholders work together: car-industry, road-operators, researchers, innovators, universities, governments, on business/use cases and handling real deployment issues.

Thank you

- Joop Veenis
- joop@veenis.net