This project is co-funded by the European Union under the Horizon 2020 (H2020) Research and Innovation Programme (grant agreement No 769115)

ENSEMBLE

ENabling SafE Multi-Brand Platooning for Europe

Introduction, Marika Hoedemaeker

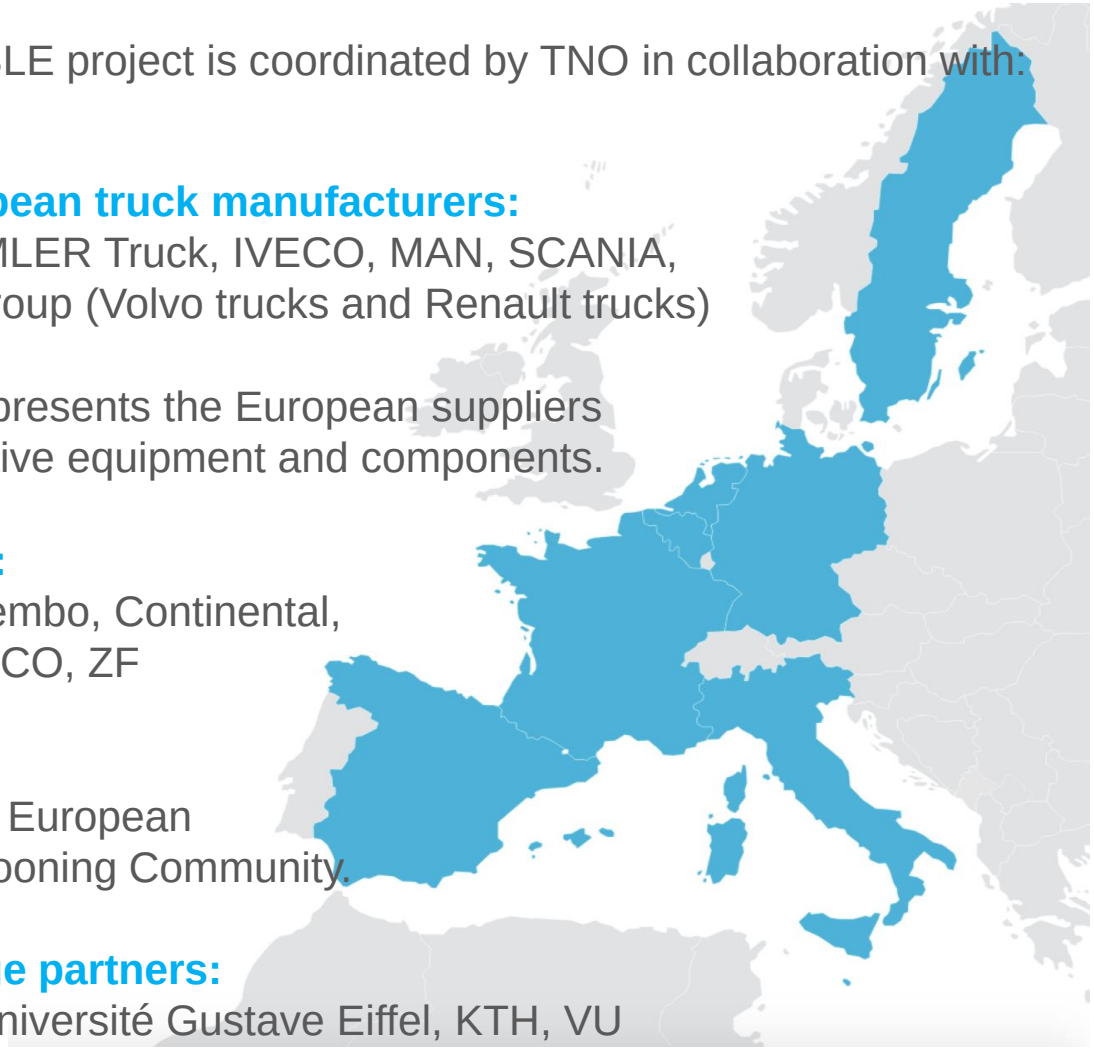
ENSEMBLE: Facts & Figures

The ENSEMBLE project is coordinated by TNO in collaboration with:

- **The European truck manufacturers:**
  DAF, DAIMLER Truck, IVECO, MAN, SCANIA, VOLVO Group (Volvo trucks and Renault trucks)
- **CLEPA** represents the European suppliers of automotive equipment and components.
- **Suppliers:**
  Bosch, Brembo, Continental, NXP, WABCO, ZF

.

- **ERTICO:**
  Link to the European Truck Platooning Community.
- **Knowledge partners:**
  IDIADA, Université Gustave Eiffel, KTH, VU Brussel.



- Innovation Action no. 769115
- 4 year EU project (June 2018 – March 2022)
- 20 million EUR EC funding
- 19 partners representing the full value chain of the automotive sector

EUCAR - ENSEMBLE

ENSEMBLE

Strengthen the Competitiveness of the European Automotive Manufacturers

through Strategic Collaborative Research & Innovation.

ENSEMBLE

Objectives

ENSEMBLE

Pave the way for the adoption of multi-brand truck platooning in Europe

HOW?

- Aligning and working on standardization of multi-brand specifications
- Implementing Platooning as a support system
- Demonstrating differently branded trucks in one platoon under real world traffic conditions
- Assessing impacts on traffic flow, business models, driver behavior and fuel economy

Truck platooning & ENSEMBLE

ENSEMBLE

Truck platooning

The linking of two or more trucks in convoy, using connectivity technology and automated driving support systems (ACEA)

Societal impact

Potential to improve road safety, reduce emissions and increase transport efficiency

An integral *multi-brand* approach is needed to move further

ENSEMBLE's goal

Harmonise multi-brand specifications, realising a Multi-brand V2V communication protocol leading to standards for *multi-brand* truck interoperability

Platooning Levels

ENSEMBLE defines two ways of platooning & will implement and demonstrate one of them

Platooning levels

Support VS Autonomous function

Platooning as Support function	Platooning as Autonomous function
Driver responsible	Driver out of the loop
Longitudinal support	Both longitudinal and lateral control
Coordinated speed, gap and braking	ODD still to be defined
THW ~ 1,5 s	THW ~ 0,5 and 1.5 s
	Driver only in first truck
Quick deployment on road	First intro in confined areas

ENSEMBLE final demonstration will show the Support function.
ENSEMBLE will provide specifications for both functions

Benefits

ENSEMBLE benefits

ENSEMBLE

- Paves the way towards autonomous platooning (comparable to SAE L4) by providing the important corner stones for the required technologies
  - communication technology
  - brake performance estimation
  - architecture for strategic and service layer (platoon matching)
- Defines platooning technology for standardization across Europe as a necessary step towards autonomous platooning

ENSEMBLE benefits: Support Function

ENSEMBLE

1. Improvement of traffic safety

- Safer distance control compared to current driving conditions
- Faster reaction to potentially dangerous braking situations because of V2V
- Possibilities of coordinated braking manoeuvres

2. Improvement of traffic flow

- More stable string of following trucks,
  even more improved when combined with strategic traffic controller
- Standard communication protocol between all trucks on the road to improve awareness for other cooperative vehicles.

3. V2X validated specifications

4. Improvement in fuel consumption

SAE (drive alone vehicle): 4-10% fuel reduction for the following vehicle (with following distance 1,5s, speed 80 km/h; based on literature). Compared to current real traffic conditions: a reduced effect on fuel consumption due to the following distances already driven.

ENSEMBLE benefits: Autonomous Function

Safety by design, not dependent on platoon driver behaviour in the following vehicles anymore

Improved traffic flow because of constant smaller following distance (i.e 20m)

Standard communication protocol between all trucks on the road, easy to adopt for passenger cars

Improvement in driver productivity and possible solution for current driver shortage problem

Positive effect on fuel consumption due to potential decreased headways

Where are we?

ENSEMBLE

2018

June:
Kick off

2019

April:
Definition of specifications

May: General Assembly

October:
Communication functions & tactical layer SW ready for implementation

2020

February:
Periodic Review

Until March:
Start Implementation on trucks,
first 3-brand tests on test tracks

COVID 19

2021

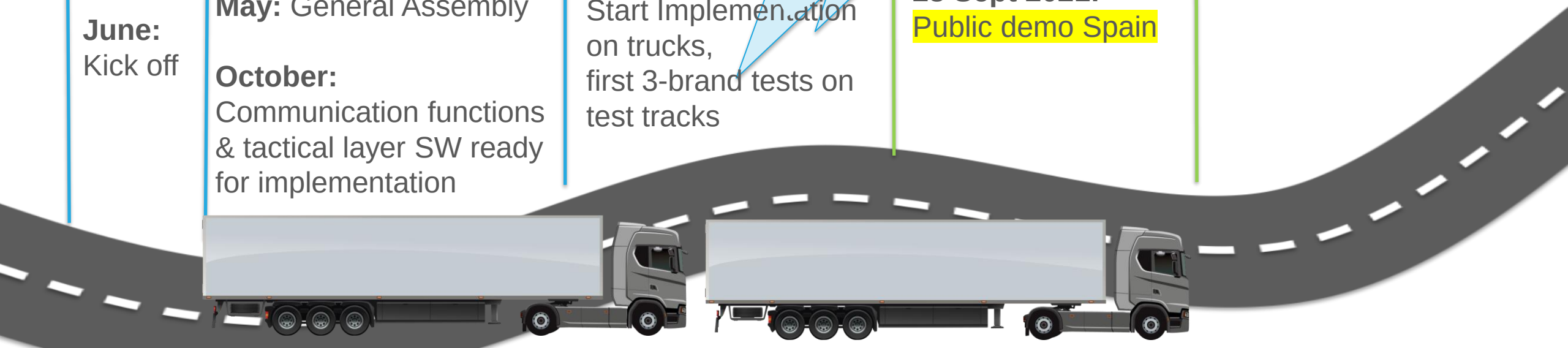
Further implementations
3-brand testing
Impact studies
Spec of autonomous function

23 Sept 2021:
Public demo Spain

2022

March 2022:
Presentation of final (impact) results

Final event Belgium



Main achievements

ENSEMBLE

- Public Demo!
- Many hours of aligning, specifying and implementation
- Many hours of testing:
  mono-brand, duo-brand, triple-brand, 7-brand
- Many public deliverables can already be found on our website

- Multi-brand platooning works in real life

Very proud!

ENSEMBLE

This project is co-funded by the European Union under the Horizon 2020 (H2020) Research and Innovation Programme (grant agreement No 769115)

Thank you for your attention

ENSEMBLE

platooningensemble.eu

Consortium leader
Marika.hoedemaeker@tno.nl