# ALICE Webinar – 24 March 2021

## HIGH-CAPACITY ROAD TRANSPORT

## FOCUSSING INNOVATION ON
## SMARTER MOBILITY SOLUTIONS FOR SMARTER POLICIES

## Efficiency improvement up to 33% by 2030

*The AEROFLEX project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 769658*

# Speakers

**Fernando Liesa**
Secretary General ALICE

**Ben Kraaijenhagen**
BeCat Germany
Technical coordinator
AEROFLEX project

**Per Elofsson**
Senior technical manager
Aerodynamics Scania Sweden

**Giuseppe Cordua**
Passive safety simulation technology manager, Iveco CNH Industrial Italy

**Marta Tobar**
R&D Responsible of the Homologation Commercial Vehicle Department, IDIADA Spain

**Hilal van der Holst**
Project manager at ZF Netherlands

**Julius Engasser**
Project Manager at the Research Department of MAN Truck & Bus SE, Germany

**Andreas Lischke**
Research associate at the department commercial transport of DLR – German Aerospace Centre, Institute of Transport Research

**Elisah van Kempen**
Research Consultant Sustainable Transport and Logistics, TNO Netherlands.

**Ton Bertens**
Manager Research and Development, VanEck Trailers Netherlands

**Henning Wittig**
Research Associate with the Fraunhofer Institute for Transportation and Infrastructure Systems (IVI), Dresden, Germany

**Christoph Jessberger**
Expert in the MAN HMI & Innovation team, MAN Truck & Bus SE Germany

# Announcement follow up sessions

- The session today gives an overview of all activities and developments within the AEROFLEX project
- The time is too short to go in depth in al topics
- Therefore,
  - The full presentation of today will be recorded and will be available on the website (ALICE and AEROFLEX)
  - We give you the opportunity to join follow up sessions (1-1,5hr) during the months May-June
- At the end of this session, we will invite you to indicate your interest to join the follow up sessions
- Below you see an overview of the intended follow up sessions. A couple of them will be part of the IPIC2021

| Nr | Topic | Month |
|---|---|---|
| 1 | e-Dolly and the next steps | May 2021 |
| 2 | Front end design for more survivability in crashes | May 2021 |
| 3 | Intelligent Access Policies | May-June2021 |
| 4 | P&G use case and next steps (focus on PUZZLE$^{R}$ and CargoCam) | June 2021 |
| 5 | Modelling of freight 2040 | June 2021 |
| 6 | Cost – Benefit Tool supporting seamless integration of AEROFLEX innovations into fleets | June-July 2021 |

# Agenda

**Use Slido:**

- To make your questions and remarks known
- To collect opinions
- To challenges audience
- To find support for IAP and eDolly
- To join project ideas beyond AEROFLEX

**14:00h** **Opening Session:**

- Welcome and rules of the webinar
- ALICE introduction (by Fernando)
- Project overview and highlights (by Ben/Per/Giuseppe)

**~14:30h** **Session I - Short presentations followed by Q&A and interactive Sessions on the following topics:**

- P&G use case and next steps: Smart Loading Units and Tools into Practice (by Ton/Hilal)
- Modelling of freight 2040: Implications of High-Capacity Transport (by Andreas/Christoph)
- e-Dolly and the next steps (by Julius/Henning)
- Intelligent Access Policies initiative and next steps (by Marta/Elisah)

**~15:45h** **Session II - Outlook and closure:**

- R&I opportunities beyond AEROFLEX (by Ben)
- Horizon Europe opportunities (by Ben)
- Outlook and closure (by Ben/Fernando)

alice | Alliance for Logistics Innovation through Collaboration in Europe

*Industry lead logistics innovation for a more competitive and sustainable industry*

Activities performed partially in the frame of WINN, SETRIS, SENSE and BOOSTLOG Projects. WINN, SETRIS, SENSE and BOOSTLOG projects have received funding from the European Union´s FP7 and Horizon 2020 research and innovation Programme under grant agreements No. 314743, No. 653739, No. 769967 & No. 101006902

# ALICE Focus

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## Develop medium-long term vision for logistics:

→ Recommendation to **European Commission** (H2020 & Horizon Europe), Member States & Industry

## Mapping and analysis of progress: R&I projects, Industry initiatives, Start-ups

→ Share innovation projects & best practices, company results → *Internal exchanges, Events and webinars*

→ Facilitate access to knowledge generated → *Knowledge Platform*

## Network for collaborative innovation in logistics

→ Find the right partners, at the right organizations, with the right level and mindset

→ Develop collaborative innovation projects supported with public funding

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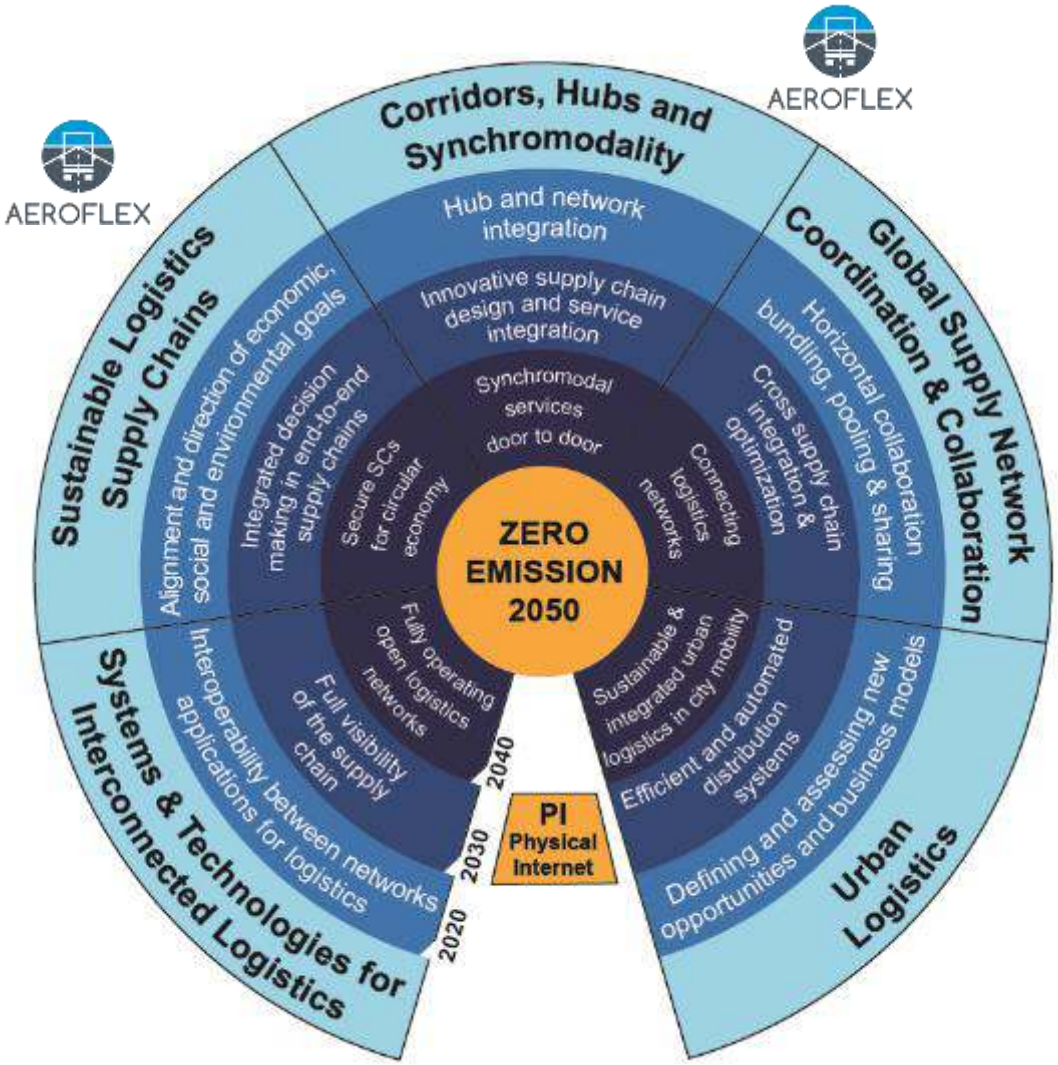
# ALICE Roadmap




**ALICE VISION is to realize Physical Internet by 2030/2040 to pave the way to Achieve Zero Emissions logistics by 2050**

**Physical Internet** will enable companies to be more efficient and sustainable. It cannot fully solve the **Decarbonization Challenge**, but it will make it less onerous **to meet and will support transition to zero emission assets**

And can deliver results in the critical next 10 years

Activities performed partially in the frame of WINN, SETRIS, SENSE and BOOSTLOG Projects. WINN, SETRIS, SENSE and BOOSTLOG projects have received funding from the European Union´s FP7 and Horizon 2020 research and innovation Programme under grant agreements No. 314743, No. 653739, No. 769967 & No. 101006902

# Towards zero emissions logistics 2050 Roadmap

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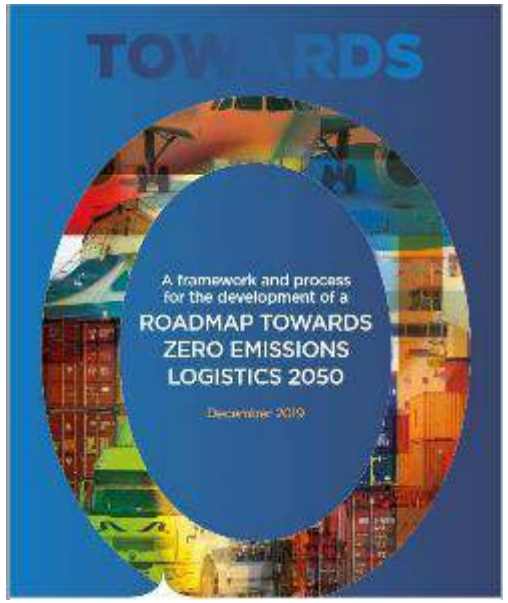
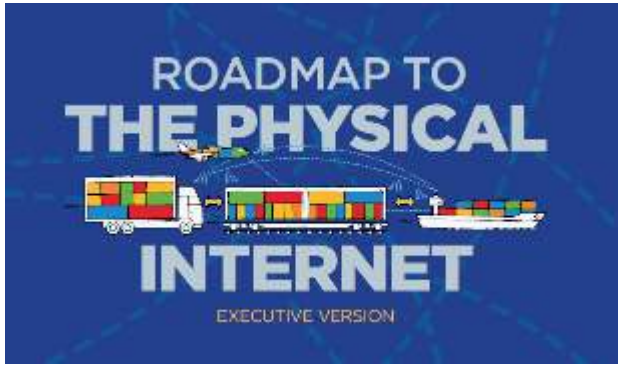



*Link to the document*




*Link to the document*

| FREIGHT DEMAND GROWTH IS MANAGED | TRANSPORT MODES ARE SMARTLY USED AND COMBINED | FLEETS AND ASSETS ARE SHARED AND USED TO THE MAX | FLEETS AND ASSETS ARE ENERGY EFFICIENT | FLEETS AND ASSETS USE LOWEST EMISSIONS ENERGY SOURCE FEASIBLE |
|---|---|---|---|---|
| • Supply chain restructuring<br>• Localization and nearshoring<br>• Decentralization of production and stockholding<br>• 3D printing<br>• Dematerialization<br>• Consumer behavior | • Increased use of rail<br>• Increase use of short sea shipping and inland waterways<br>• Modular road transport<br>• Cargo bikes<br>• Multi-modal optimization<br>• Synchromodality | • Load optimization<br>• Load consolidation and asset sharing<br>• Reduce empty moves<br>• Modular packaging and boxes<br>• Open transport networks and warehouses<br>• Increase storage density and energy efficiency | AEROFLEX<br>• Cleaner and efficient technologies<br>• Efficient vehicles and vessels<br>• High capacity vehicles / duo trailers<br>• Driving behavior<br>• Fleet operation<br>• Fleet maintenance | • Electric / hybrids<br>• Solar / Wind<br>• Biofuels<br>• Hydrogen<br>• CNG/bio-LNG<br>• Cleaner diesel<br>• Fuel management |

© Smart Freight Centre and ALICE-ETP based on A. McKinnon 'Decarbonizing Logistics' (2018) Roadmap Towards Zero Emissions Logistics 2050. ALICE (2019) www.etp-alice.eu

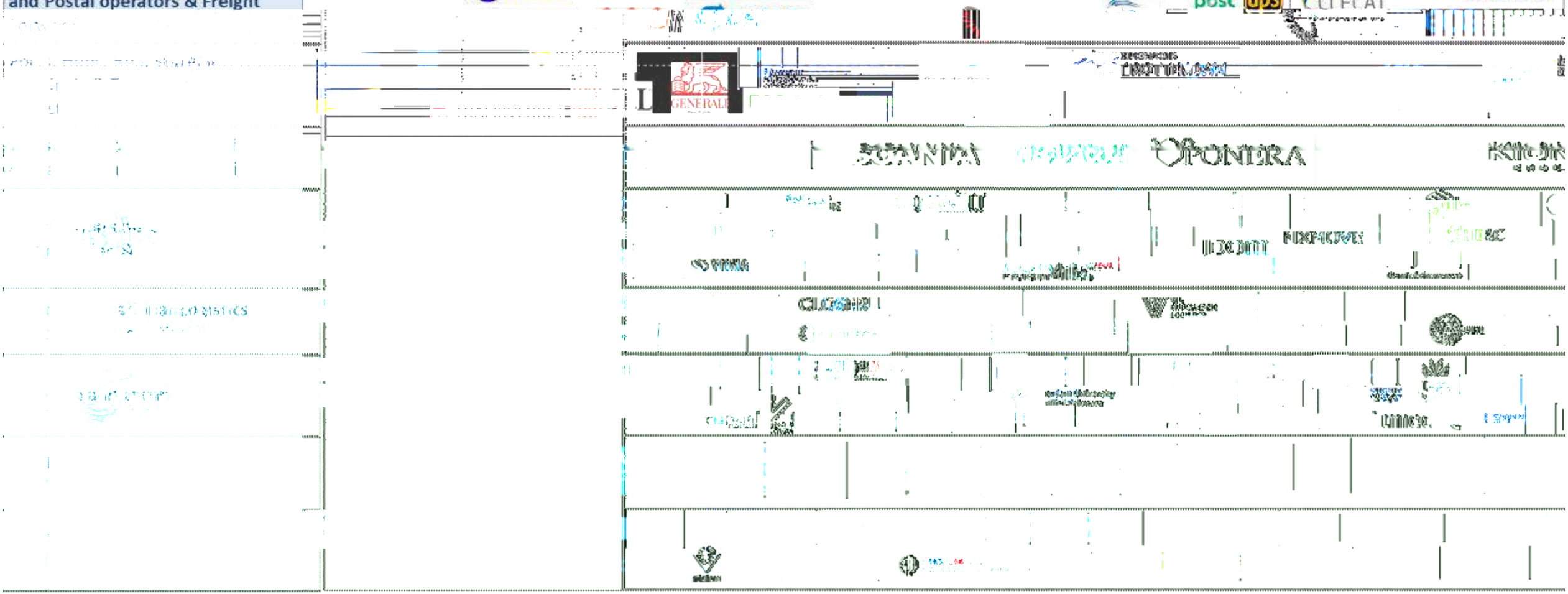
PI PHYSICAL INTERNET

**Making assets transition affordable!**

Activities performed partially in the frame of WINN, SETRIS, SENSE and BOOSTLOG Projects. WINN, SETRIS, SENSE and BOOSTLOG projects have received funding from the European Union´s FP7 and Horizon 2020 research and innovation Programme under grant agreements No. 314743, No. 653739, No. 769967 & No. 101006902

## ALICE membership is bringing an holistic approach → All key logistics stakeholders represented!

| Type of Organization | Members | EU/International Associations |
|---|---|---|
| Shippers & Retail | P&G, L'ORÉAL, proximus, Atlas Copco, HOFER, COLRUYT GROUP, Unilever | ESC, cefic, ELUPEG, GS1 |
| Logistics Service Providers, Courier and Postal operators & Freight | Gebrüder Weiss, GEODIS, BORUSAN LOJİSTİK, FM LOGISTIC, Posteitaliane, senner, GRUBER LOGISTICS, an post, UPS | CLECAT, EALTH |



* Involved in ALICE Mirror Group

# *ALICE ambition*

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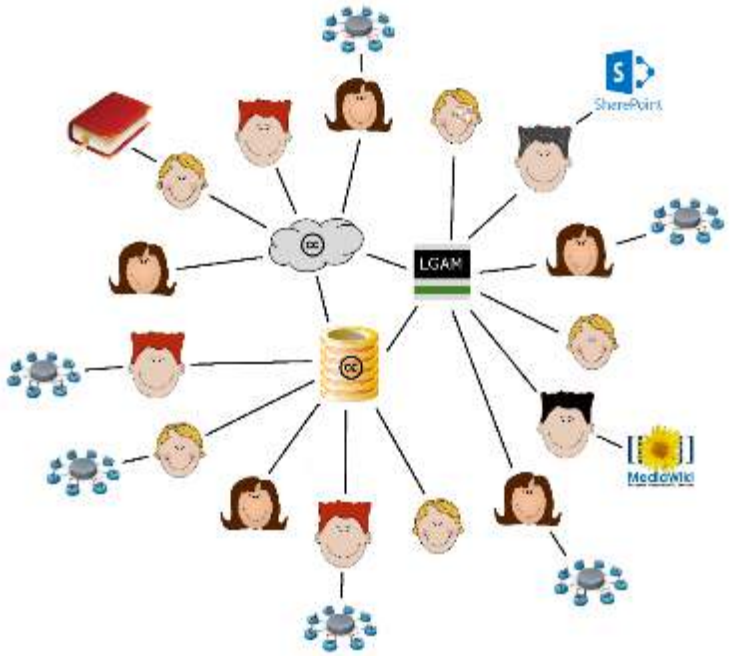




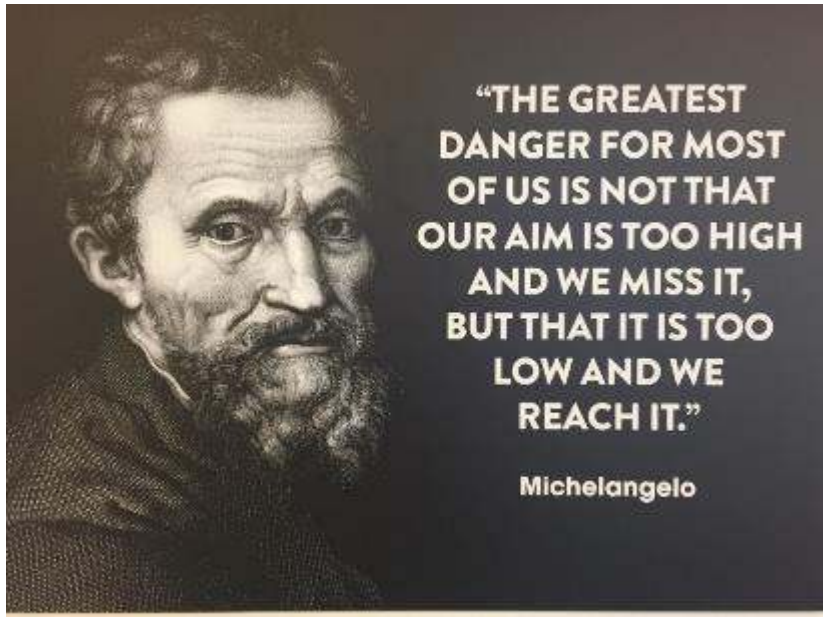







# THE reference logistics and supply chain think tank and knowledge management organization in Europe

Activities performed partially in the frame of WINN, SETRIS, SENSE and BOOSTLOG Projects. WINN, SETRIS, SENSE and BOOSTLOG projects have received funding from the European Union´s FP7 and Horizon 2020 research and innovation Programme under grant agreements No. 314743, No. 653739, No. 769967 & No. 101006902

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# *Thank you!*

# The Best Way To Predict The Future Is To Create It!

***Source: President Abraham Lincoln***

*If you want to go fast, go alone If you want to go far, go together*

[www.etp-alice.eu](http://www.etp-alice.eu)

[info@etp-alice.eu](mailto:info@etp-alice.eu)



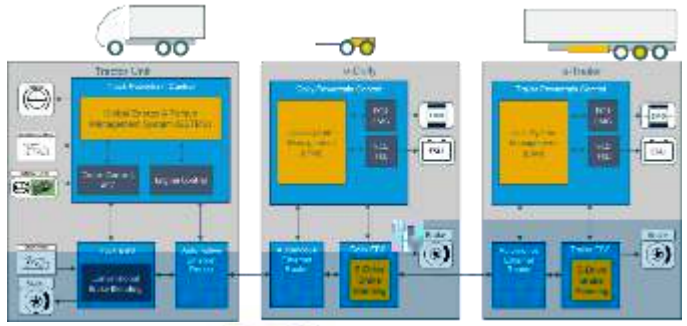


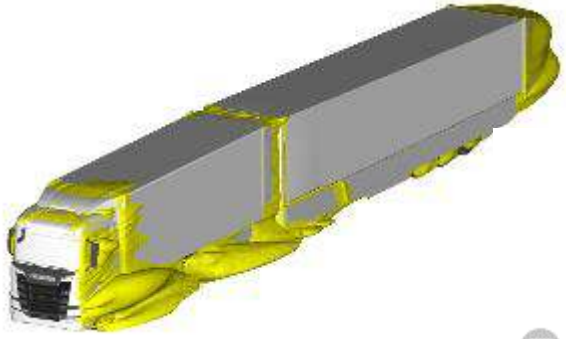

Activities performed in the frame of SENSE *"Accelerating the Path Towards the Physical Internet".* The SENSE project has received funding from the European Union´s Horizon 2020 research and innovation Programme under grant agreement No. 769967

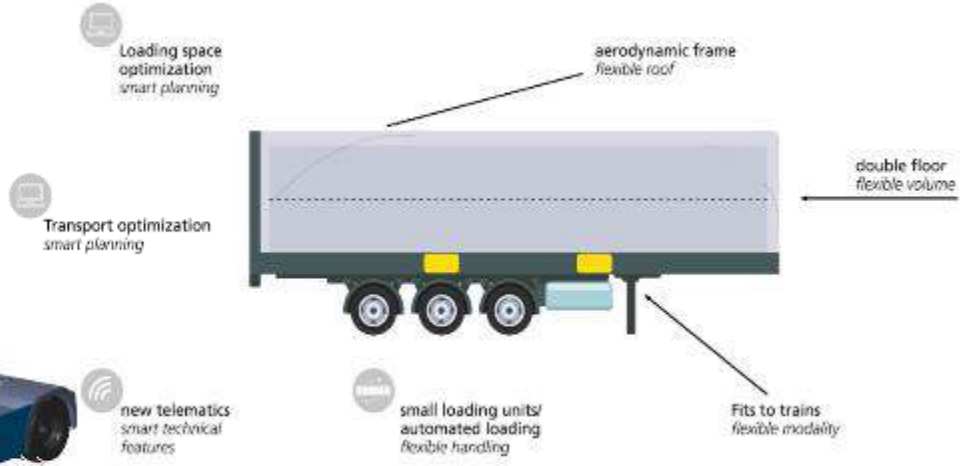
# Project partners

# Technologies & Innovations

- An **Energy Management Powertrain** architecture for distributed powertrains
- A **Smart Steerable Dolly** for EMS vehicles and automated yard operations
- **Active Aerodynamic Devices** for the complete vehicle, adaptable to the logistics task
- **Smart Loading Units and Tools** for more effective loading space utilisation and multimodal transport
- **Front-end design** for more safety and survivability for driver, road users and VRU

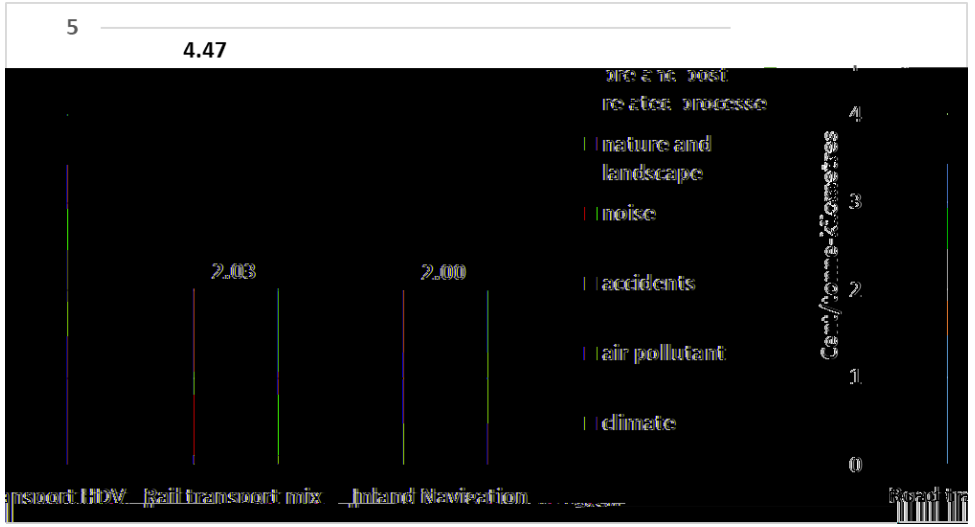


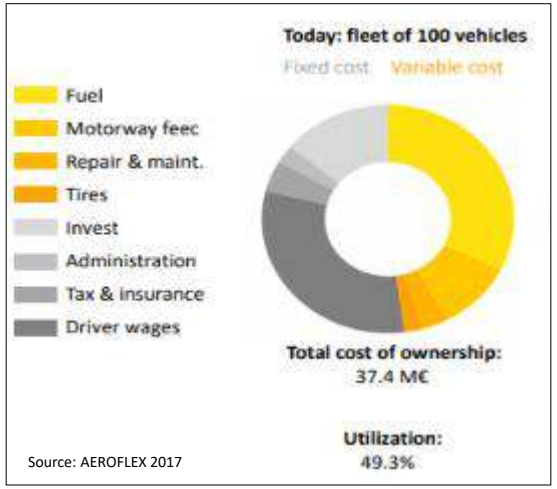




# Challenges addressed within AEROFLEX

- Transport sector app. 25% of the total CO2 emissions in Europe*
- Growth of demand of transport app. 20% by 2030*
- Green Deal target for transport 90% CO2 reduction by 2050*
- The cost for transport
  - Road transport; climate impact and accidents > 50% of ct/tkm
  - Pre and post related processes app. 1ct/tm
    (20-25% for road and 50% for rail & inland navigation)
- The TCO of a typical long-haul fleet
  - Driver wages and fuel > 66%
  - Utilization app. 49%
- AEROFLEX project targeted an efficiency improvement up to 33%, meaning less:
  - **CO2 emissions and impact on climate**
  - **Road accidents, injuries and fatalities**
  - **TCO and vehicle kilometers per ton freight**
  - **Cost pre & post related processes**

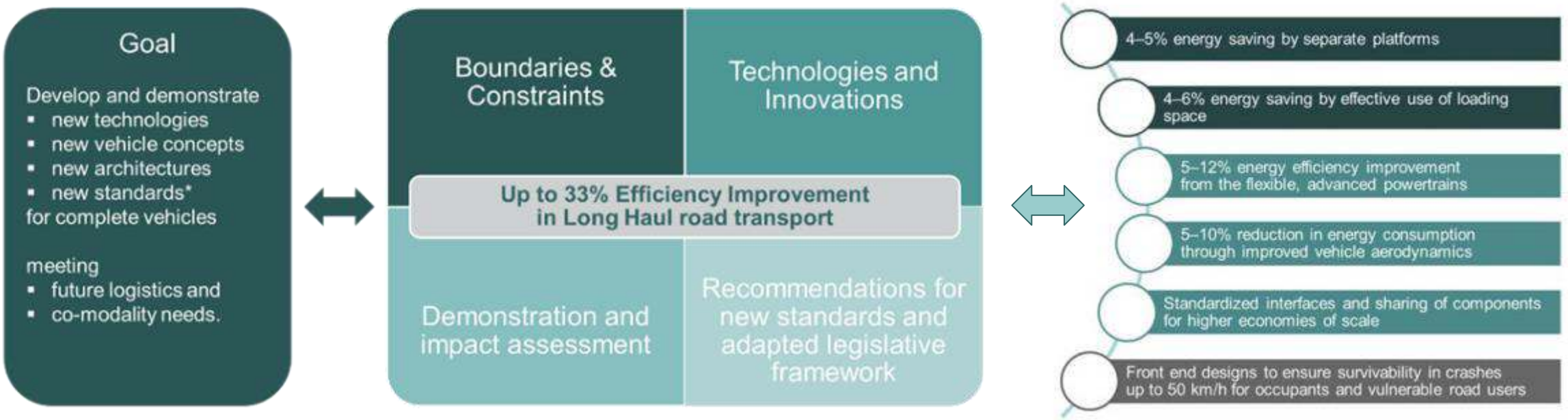





*White paper 2011, Freight transport development until 2050 (European Environment Agency 2007), https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

# Efficiency improvement up to 33%




*new standards for hybrid-distributed powertrain, aerodynamic devices for complete vehicle, utilisation of loading units, performance based standards (PBS), access to infrastructure in a multi-mode context

- The optimal matching of novel vehicle concepts and infrastructures require the definition of smart **(performance-based)** standards for future trucks, load carriers and access to road infrastructures **(Intelligent Access Policies).**

# Demonstration vehicles


- **Tested baseline vehicle:**
  - MAN 4x2 + Curtain semitrailer (Zero-case)

  - SCA 4x2 + Box semitrailer (Aero baseline)

- Advanced reference (TRANSFORMERS project):
  - MAN 4x2 + TF - SCB

  - SCA 4x2 + TF – VET

- EMS 1 (25m) reference
  - MAN 6x2 – Curtain semitrailer

  - SCA 6x2 – Box semitrailer

Currently tested

- **Beyond State of the Art:**
  - MAN 6x2 + e-Dolly + e-Trailer SCB

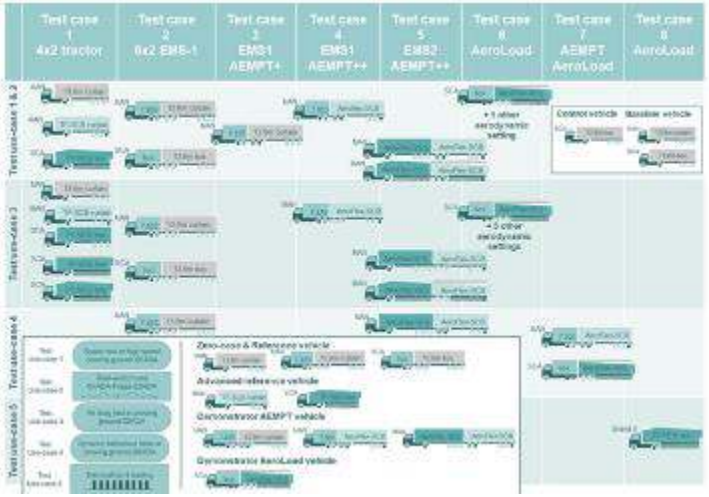
Currently tested

  - Scania 6x2 + Aero-Dolly + Aero-Trailer VET

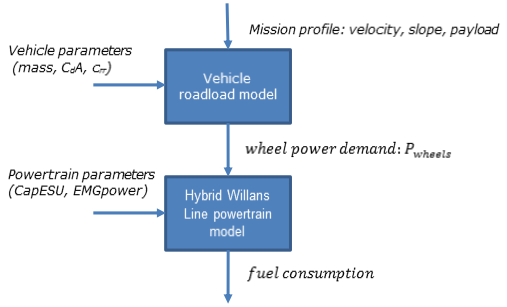
Q2/2021

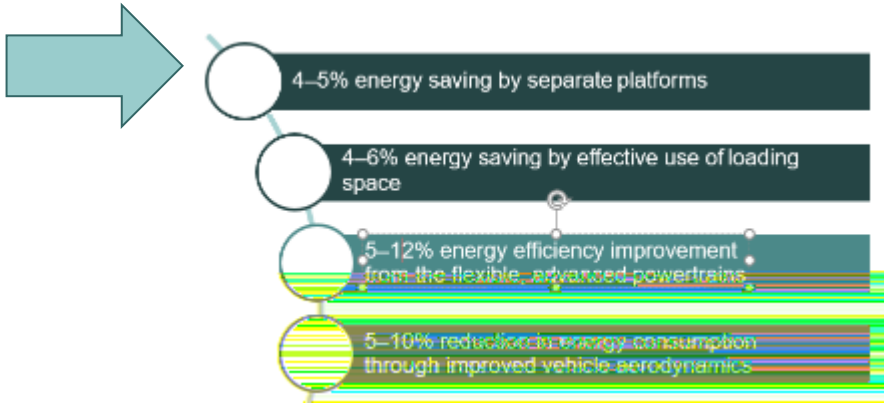
  - MAN 4x2 + Aero-Trailer VET + e-Trailer SCB

# Evaluation, impact assessment and cost-benefit

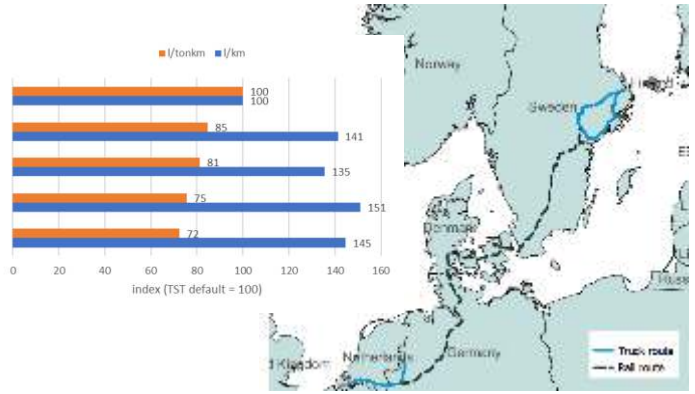



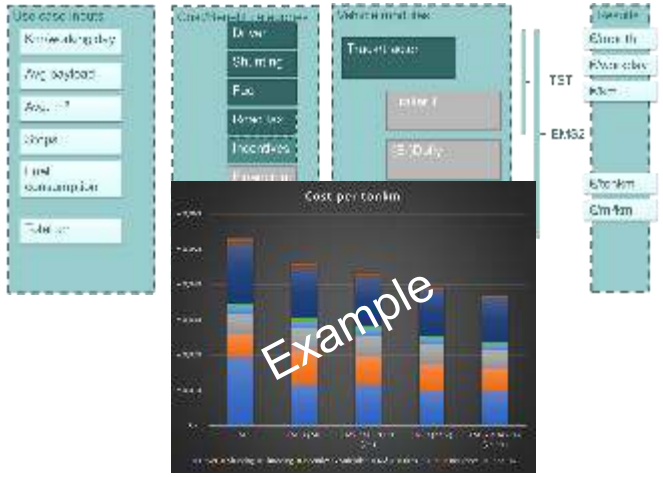

Testing




Evaluation

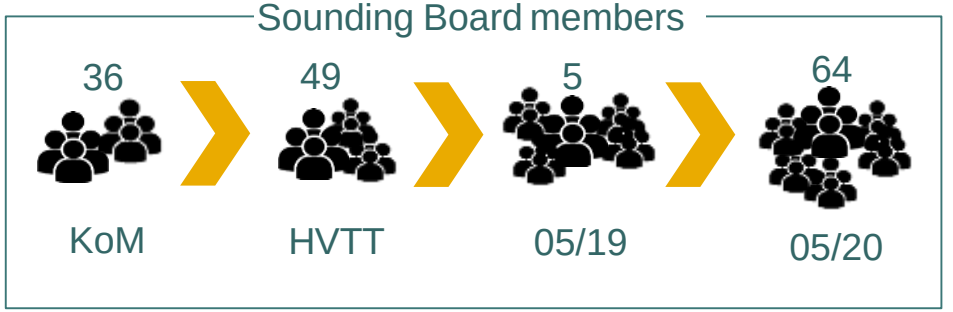


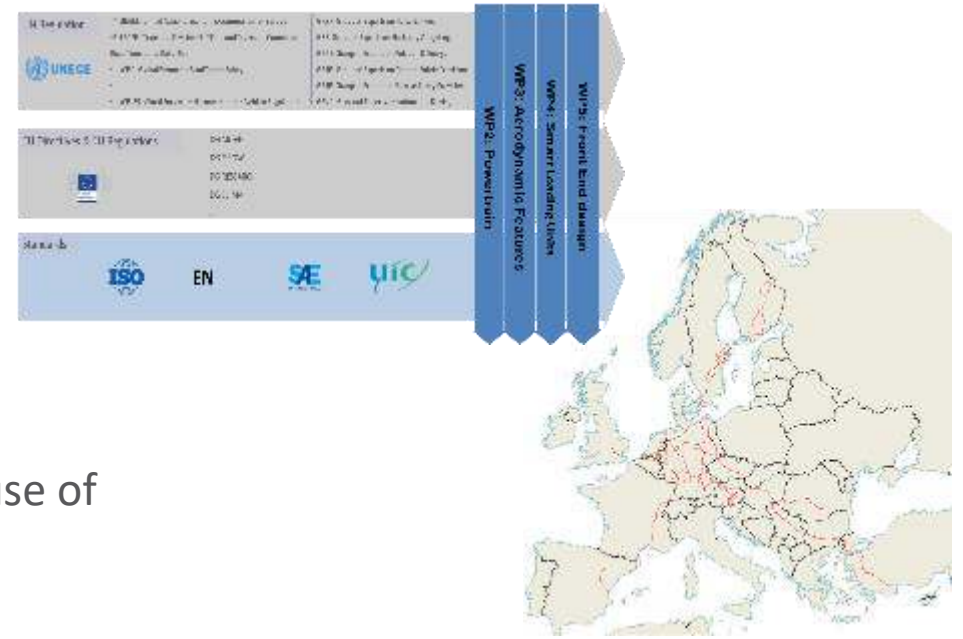

Real world impact assessment & Cost benefit

# Demonstration and Impact Assessment


- Establishment of a **Sounding Board** to advise and help guide the process of defining the recommendations for implementation of the solutions and measures developed within the AEROFLEX project




- Drafting of coherent **recommendations for revising standards and legislative frameworks** in order to allow the new aerodynamic and flexible vehicle concepts on the road




- **Recommendations** for policy-makers, authorities and industry on **standardization issues and a legislative framework** for multi-modal use of the vehicle concepts and innovations developed within AEROFLEX

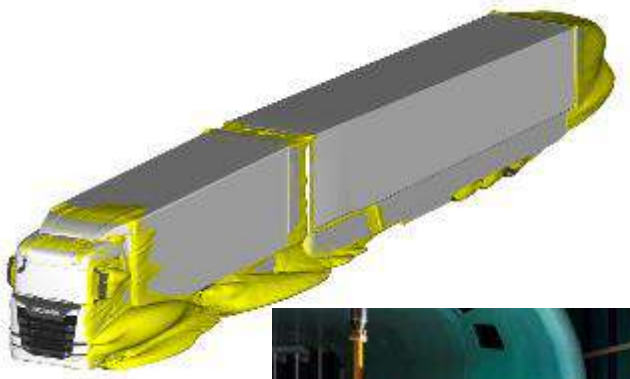
# Aerodynamic features for complete vehicle

## Concept

- Both active and passive aerodynamic features
- CFD simulations used for development of aerodynamic features
- Simulations verified by scale model wind tunnel tests
- Final verification with a demonstrator

## Progress since Sept 2020

- Demonstrator handed over to IDIADA for final testing
- D3.5 Build-up demonstrator
- CFD simulations on final demonstrator geometry and EMS2 configurations finished
- Detailed planning of publications and presentations




# Fourteen aero features implemented


Truck

- an active air deflector,
- adjustable ride height,
- truck side skirt extensions,
- a swap body with a movable roof,
- [illegible]
- a gap reducer.

Dolly

- aerodynamically shaped dolly skirts
- adjustable ride height.

Entire vehicle

- an Aerodynamic Vehicle Control system, which controls and [illegible]
- Vehicle wide communication is achieved using the Automotive Ethernet Router Repeater.

Trailer

- an adjustable ride height,
- a movable roof,
- active side skirt extensions,
- a diffusor,
- [illegible]
- a boat tail side panel extension.

# Results and benefits

## Results

- Tractor semitrailer ΔCdxA= >40%
- EMS1 ΔCdxA= 40%
- Demonstrator (EMS1) ΔCdxA= 29%


## Benefits for industry and society

- Reduced energy consumption and $CO_2$ emissions from improved aerodynamics.
- Active aerodynamic features ensure optimum performance at all circumstances with no restrictions in handling of cargo during loading a/o unloading.

# Front End Design and vehicle architecture, protection of car and truck occupants

## Concept

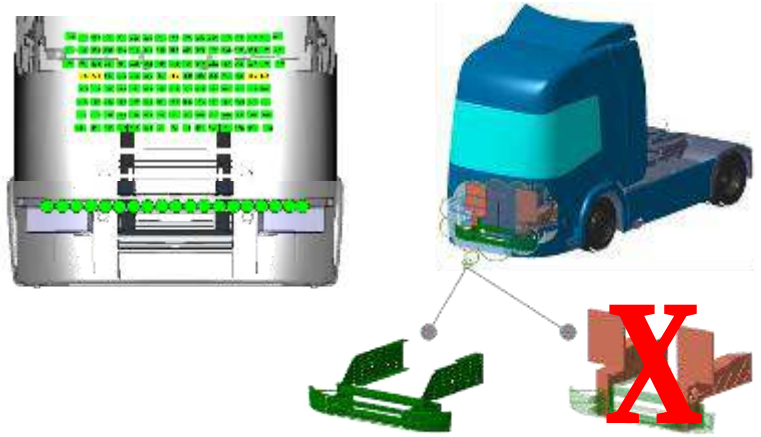
- Rear-end crashes are the most relevant scenario.
  Add protective structures in the elongated front end of the AEROFLEX truck.
- Investigate the use of ADAS (AEB, SGW, LSS)

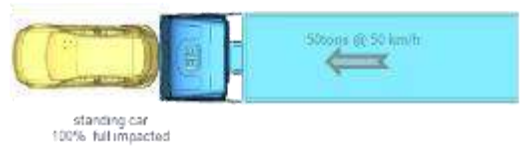
## First results

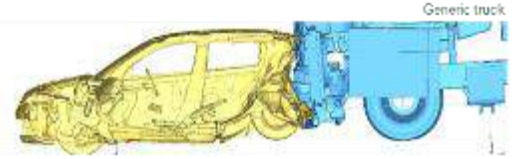
- Passenger car protection: specific crash absorber designed to absorb energy during the collision.
- Truck occupant's protection: simulations highlight the huge amount of crash energy that cannot be effectively absorbed by any protective structures, despite frontend elongation.
- Use of active safety systems obligatory to avoid truck – truck collisions and to better preserve all the other road users.

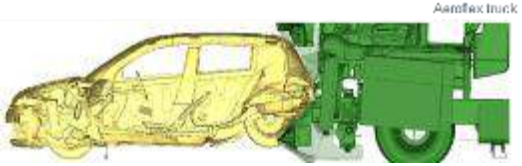
## Benefits

- Use of ADAS to avoid collisions with other vehicles and VRU and in combination with earlier mentioned features avoid serious injuries and fatalities

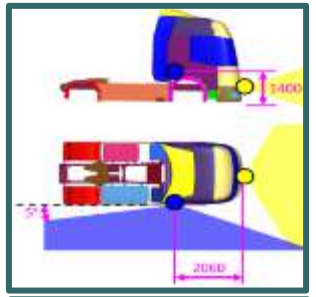


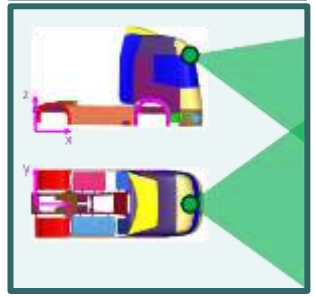



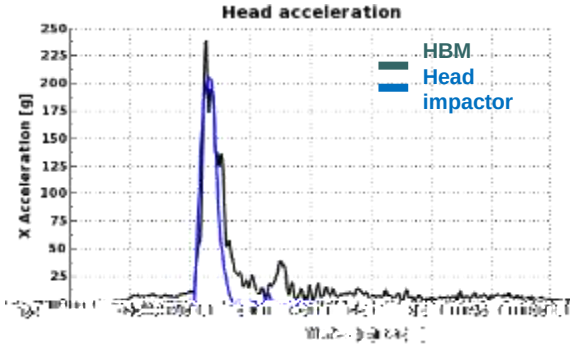

intrusion on fuel tank compartment -50%





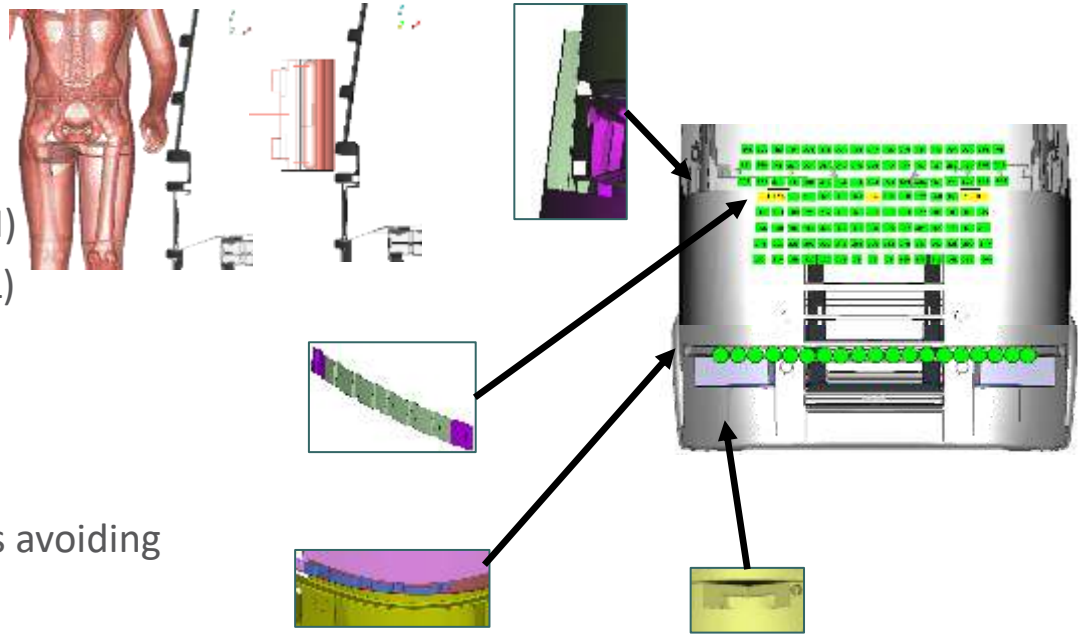
# Front End Design and vehicle architecture, protection of humans

## Concept




- Impact with pedestrians are one of the most relevant scenarios involving VRUs
- Human Body Modelling (HBM) for impact simulations
- Adult Head (AH) and Pelvis (upper leg UL) impactors equivalence to HBM

## First results



- Front End modifications for VRUs
- Add some gap between external skin and windscreen glue area (AH)
- Add reinforcement in glue area to increase the energy absorption (AH)
- Reduce the headlamp box to reduce the local stiffness in this area (UL)
- Add a reinforcement to improve the energy absorption (UL)

## Benefits

- Extended front end can be equipped with above summarized features avoiding serious injuries a/o fatalities for VRUs

# Front End Design and vehicle architecture, Active safety systems

## Concept

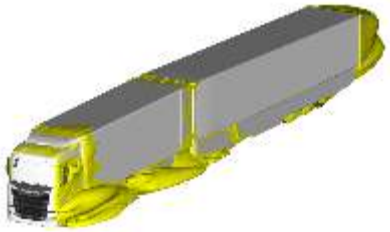
- Following ADAS were virtually installed, configured and tested on the Aeroflex truck in order to bring more safety:
  - Automated Emergency braking (AEB)
  - Side guard warning (SGW)
  - Line support system (LSS)

## Benefits

- ADAS reduce serious and fatal injuries in combination with the earlier structural features mentioned before

*For more details; TRA paper "An analysis of European crash data and scenario specification for heavy truck safety system development "*

# Q&A Slido



- What aerodynamic features are in your view the most promising and easy to handle in your daily operation?

1) active cab air deflector
2) adjustable ride height
3) active side skirt extensions
4) underbody covers

5) gap reducer
6) aerodynamically shaped dolly skirts

7) movable roof of loading unit
8) adaptable boat tail

**SLIDO:**
Which criteria are most important for you ?

1) weight penalty
2) easiness of handling
3) active setting instead manual setting
4) clear cost benefit
5) other (use chat)

- A combination is allowed -

# End of part 1

# Agenda Part 2

**Use Slido:**

- To make your questions and remarks known
- To collect opinions
- To challenges audience
- To find support for IAP and eDolly
- To join project ideas beyond AEROFLEX

**14:00h** **Opening Session:**

- Welcome and rules of the webinar
- ALICE introduction (by Fernando)
- Project overview and highlights (by Ben/Per/Giuseppe)

**~14:30h** **Session I - Short presentations followed by Q&A and interactive Sessions on the following topics:**

- P&G use case and next steps: Smart Loading Units and Tools into Practice (by Ton/Hilal)
- Modelling of freight 2040: Implications of High-Capacity Transport (by Andreas/Christoph)
- e-Dolly and the next steps (by Julius/Henning)
- Intelligent Access Policies initiative and next steps (by Marta/Elisah)

**~15:45h** **Session II - Outlook and closure:**

- R&I opportunities beyond AEROFLEX (by Ben)
- Horizon Europe opportunities (by Ben)
- Outlook and closure (by Ben/Fernando)

# Keep healthy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