

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



Fernando Liesa
Secretary General ALICE



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



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



Ben Kraaijenhagen
BeCat Germany
Technical coordinator
AEROFLEX project



Hilal van der Holst
Project manager at ZF
Netherlands



Ton Bertens
Manager Research and
Development, VanEck Trailers
Netherlands



Per Elofsson
Senior technical manager
Aerodynamics Scania Sweden



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



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



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



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



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 all 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

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)

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

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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

Develop medium-long term vision for logistics:

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



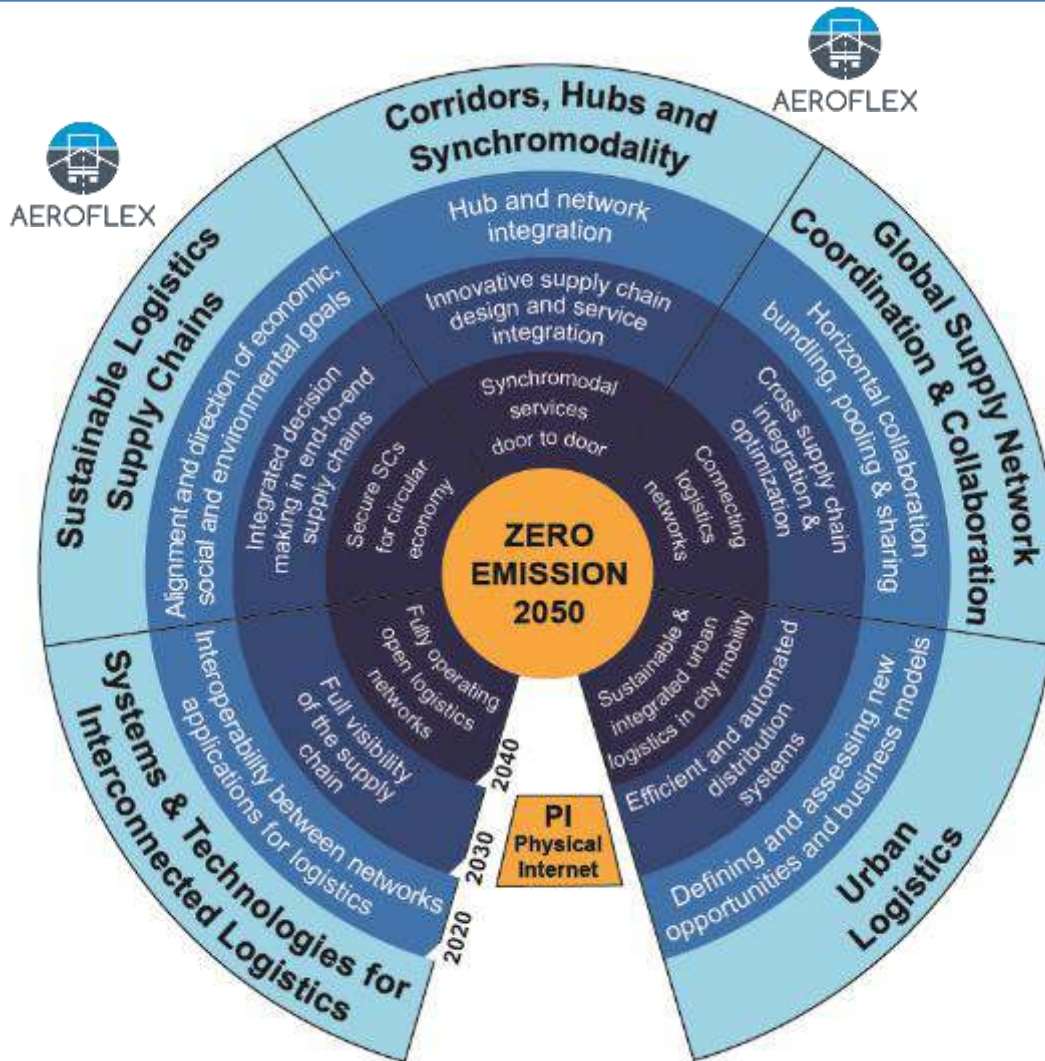
Mapping and analysis of progress: R&I projects, Industry initiatives, Start-ups

- 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



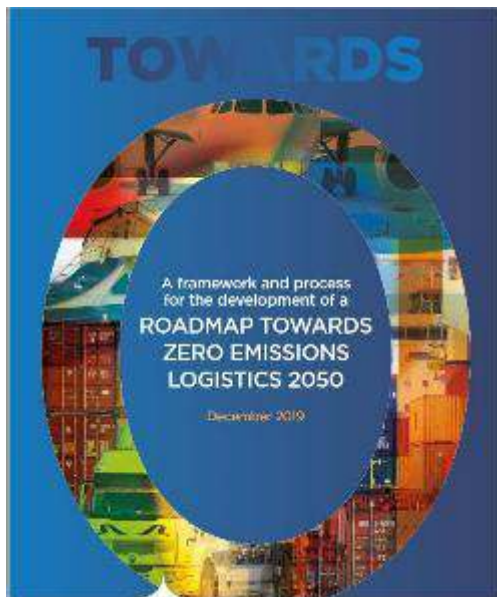


ALICE VISION is to realize Physical Internet by 2030/2040 to pave the way to Achieve Zero Emissions logistics by 2050

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

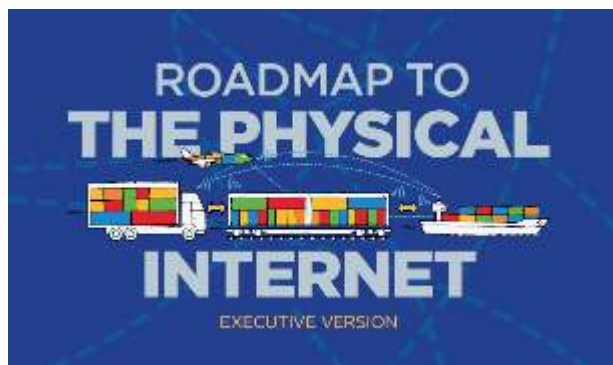
Towards zero emissions logistics 2050 Roadmap



[Link to the document](#)



© 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



[Link to the document](#)



PI PHYSICAL
INTERNET

Making assets transition affordable!

→ All key logistics stakeholders represented!

Type of Organization	Members	EU/International Associations
Shippers & Retail	      	   
Logistics Service Providers, Courier and Postal operators & Freight Forwarders	        	  
Ports, Hubs, Real State, Intermodal terminals & Transport Infrastructure	           	 
Transport and industry vehicles, packaging & material handling	     	
Information and Communication Technologies & Consultancy	         	 
Regional & National Logistics Clusters & Associations	         	
Research and technology Centers	        	 
European Technology Platforms / PPPs	    	
Member States and innovation Funding*	     	

* *Involved in ALICE Mirror Group*

ALICE liaison with projects & industry initiatives ([Link](#))

New in 2020:



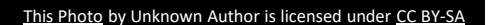
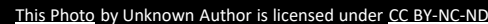
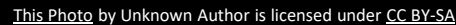
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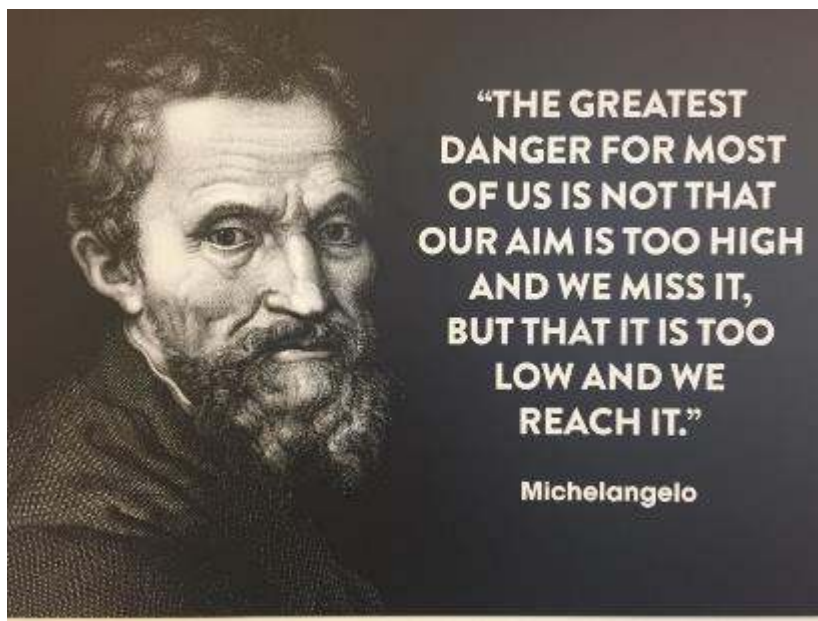
Finished:



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



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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

info@etp-alice.eu



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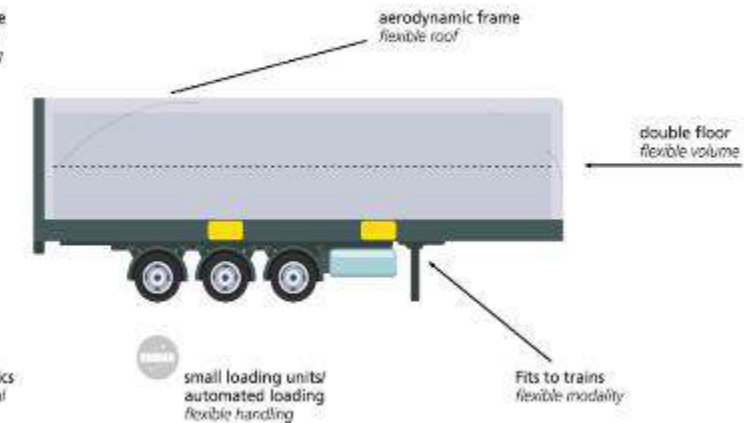
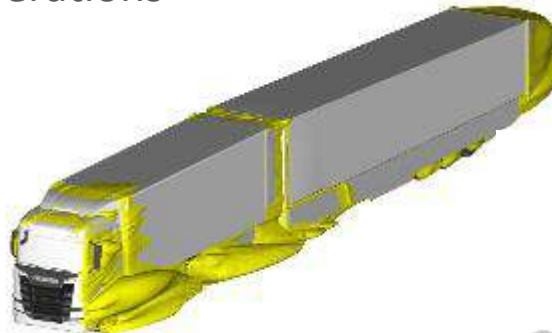
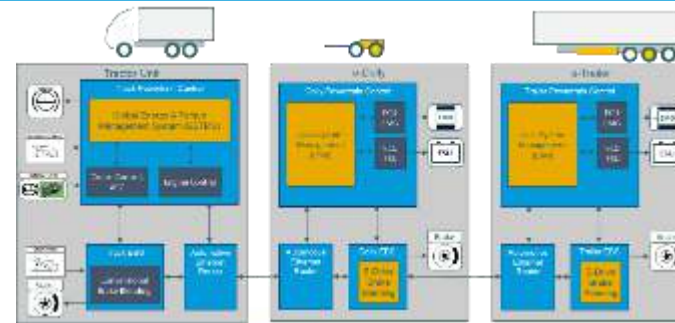
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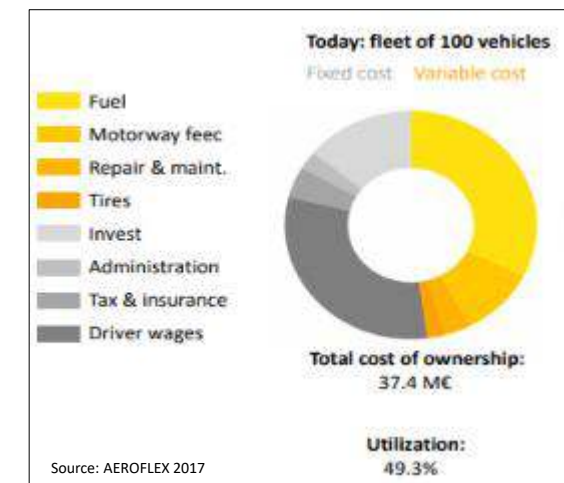
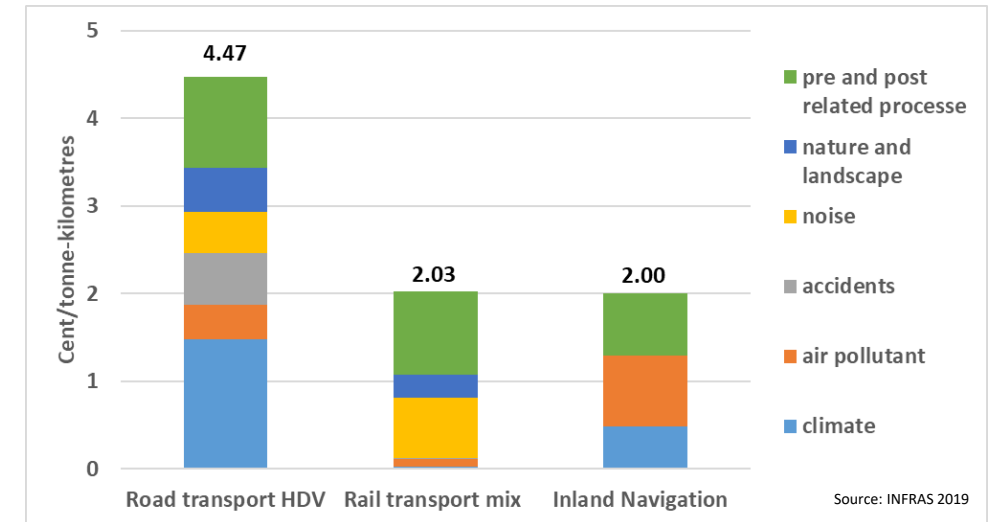


- An **Energy Management Powertrain** architecture for distributed powertrains
- A **Smart Steerable Dolly** for EMS vehicles and automated yard operations
- **Active Aerodynamic Devices** for the complete vehicle, adaptable to the logistics task
- **Smart Loading Units and Tools** for more effective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

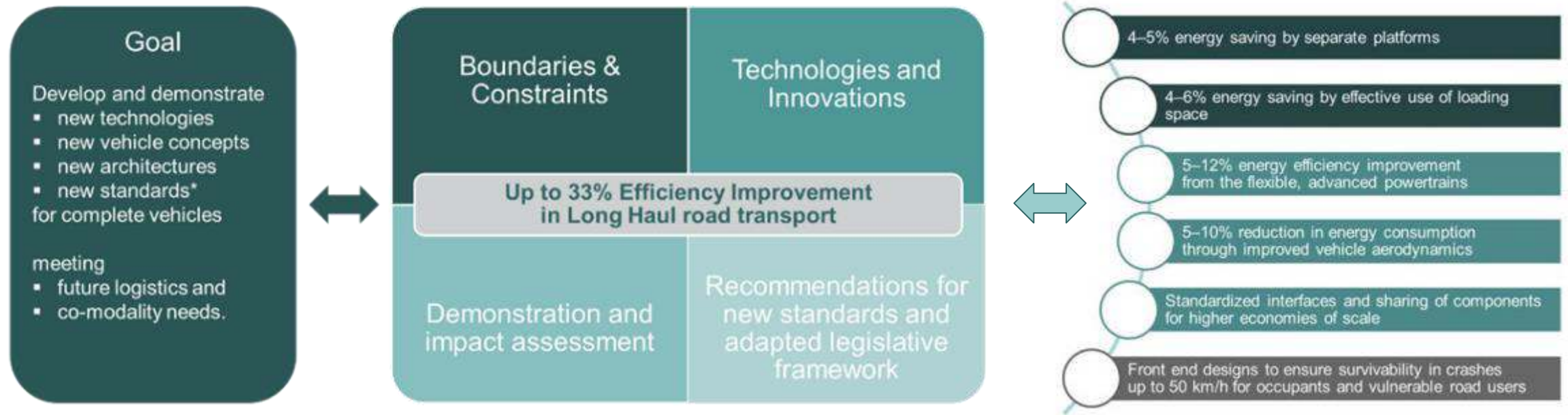


Challenges addressed within AEROFLEX

- 🌐 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**



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

Boundaries & Constraints	Technologies and Enablers
Up to 20% Efficiency Improvement in Long-Haul road transport	
Demonstration and Impact assessment	Recommendations for new standards and assumed hypotheses from 2025-28

Tested baseline vehicle:

- MAN 4x2 + Curtain semitrailer (Zero-case)



- Advanced reference (TRANSFORMERS project):

- MAN 4x2 + TF - SCB



- EMS 1 (25m) reference

- MAN 6x2 – Curtain semitrailer



- SCA 4x2 + Box semitrailer (Aero baseline)



- SCA 4x2 + TF – VET



- SCA 6x2 – Box semitrailer



Currently tested

Beyond State of the Art:

- MAN 6x2 + e-Dolly + e-Trailer SCB



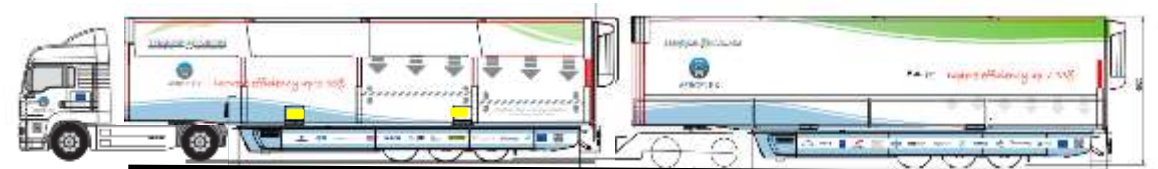
Currently tested

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

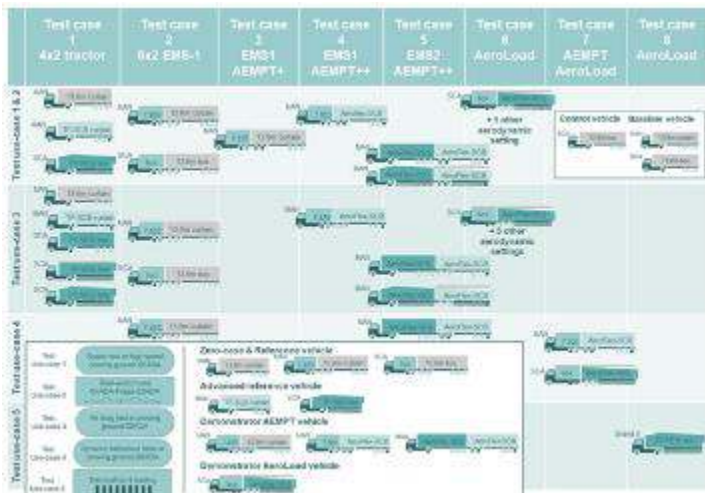


Q2/2021

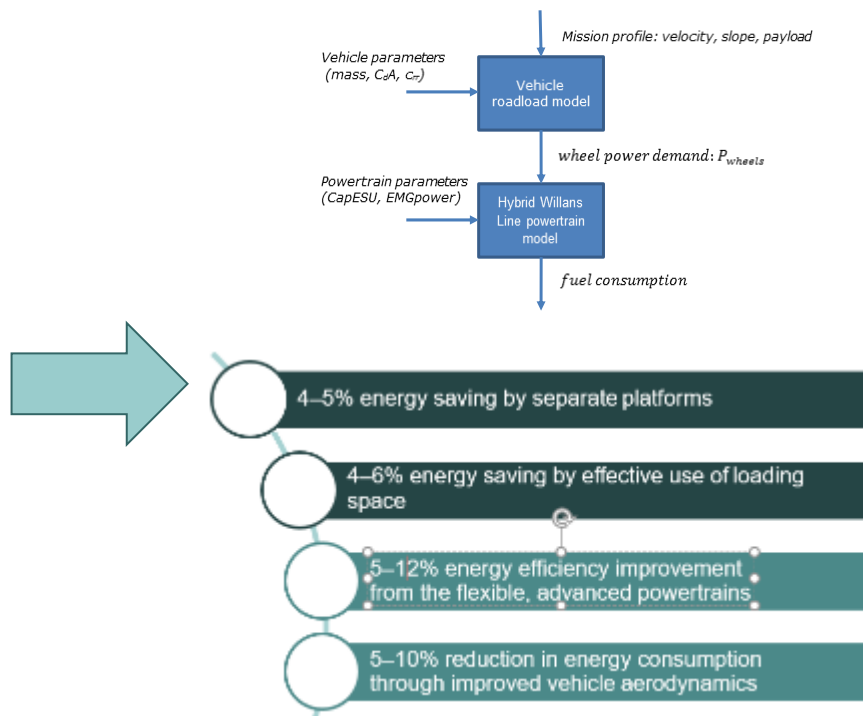
- MAN 4x2 + Aero-Trailer VET + e-Trailer SCB



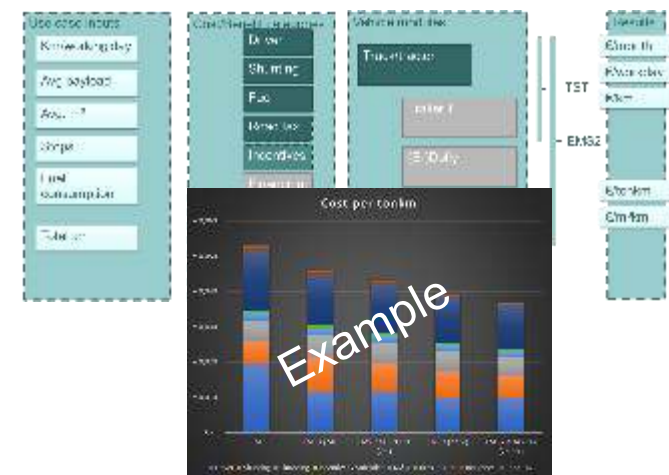
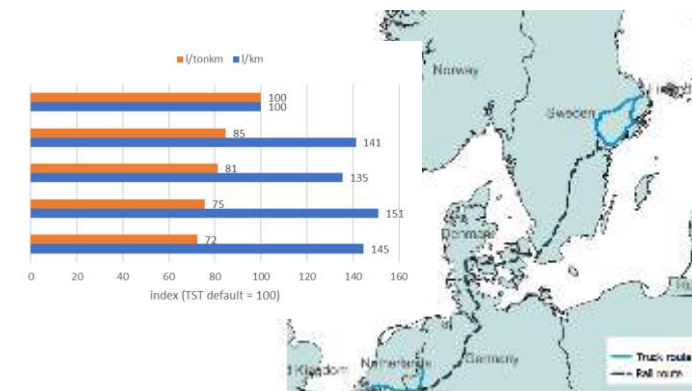
Evaluation, impact assessment and cost-benefit



Testing

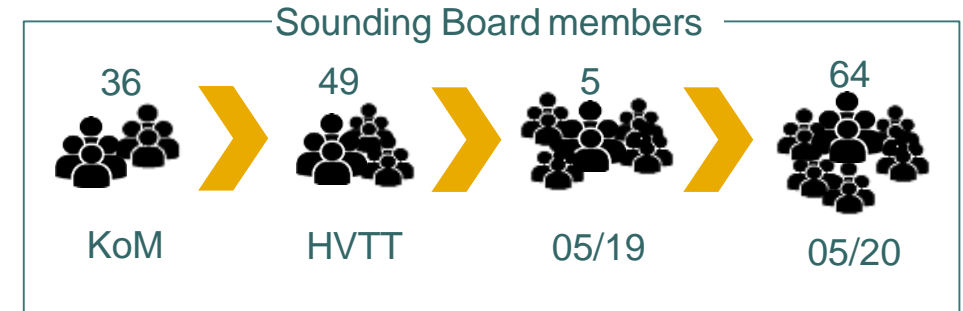


Evaluation



Real world impact assessment & Cost benefit

- 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



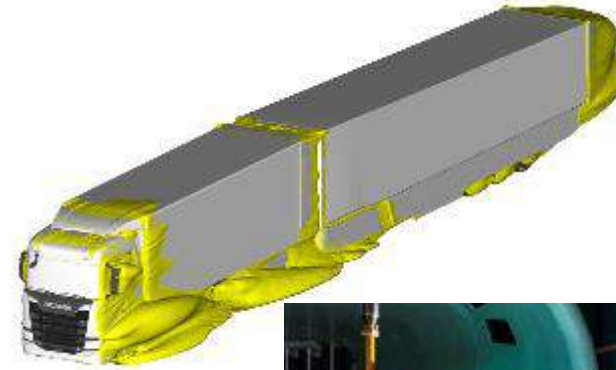
Aerodynamic features for complete vehicle

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,
- underbody covers
- a gap reducer.

Dolly

- aerodynamically shaped dolly skirts
- adjustable ride height.

Entire vehicle

- an Aerodynamic Vehicle Control system, which controls and harmonizes all aerodynamic features.
- Vehicle wide communication is achieved using the Automotive Ethernet Router Repeater.

Trailer

- an adjustable ride height,
- a movable roof,
- active side skirt extensions,
- a diffuser,
- an adaptable boat tail,
- a boat tail side panel extension.

Results

- Tractor semitrailer $\Delta C_{dxA} = >40\%$
- EMS1 $\Delta C_{dxA} = 40\%$
- Demonstrator (EMS1) $\Delta C_{dxA} = 29\%$



Benefits for industry and society

- Reduced energy consumption and CO₂ 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

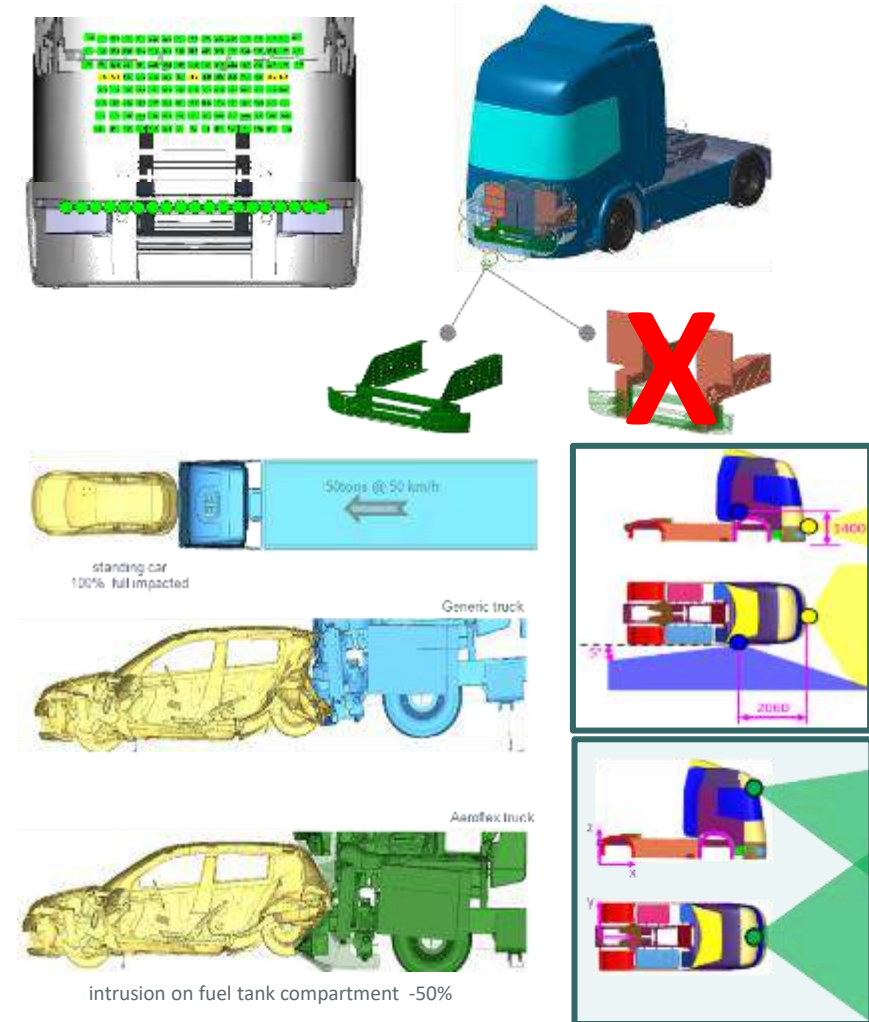
- Rear-end crashes are the most relevant scenario.
Add protective structures in the elongated front end of the AEROFLEX truck.
- Investigate the use of ADAS (AEB, SGW, LSS)

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

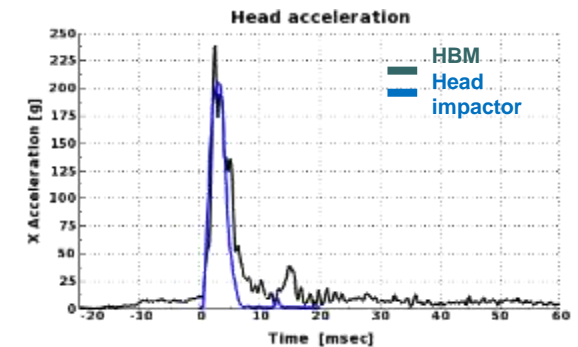
- Use of ADAS to avoid collisions with other vehicles and VRU and in combination with earlier mentioned features avoid serious injuries and fatalities



Front End Design and vehicle architecture, protection of humans

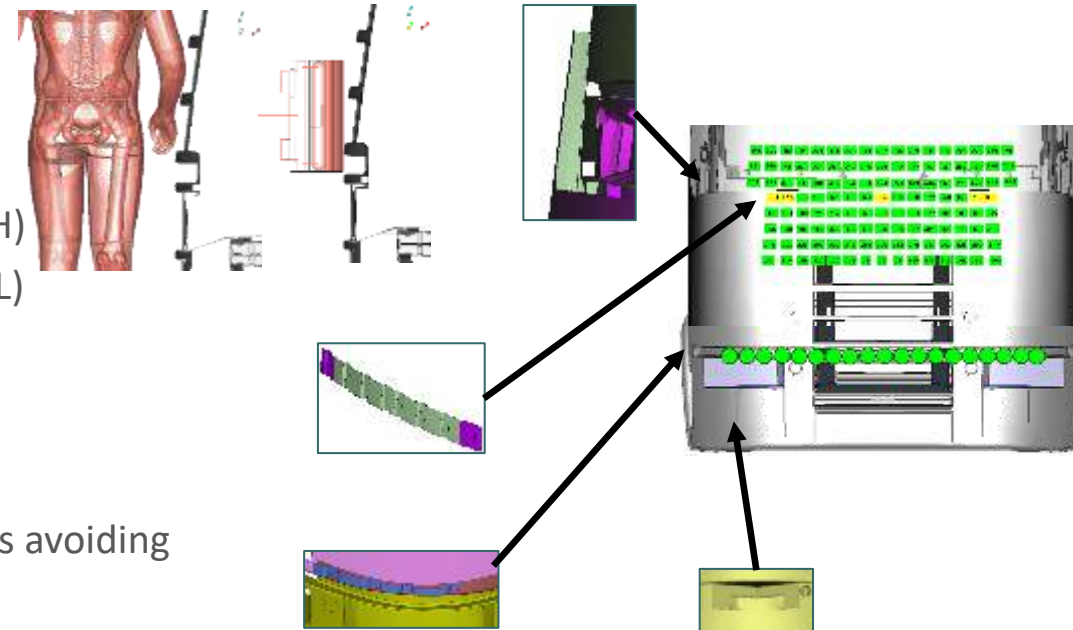
Concept

- 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

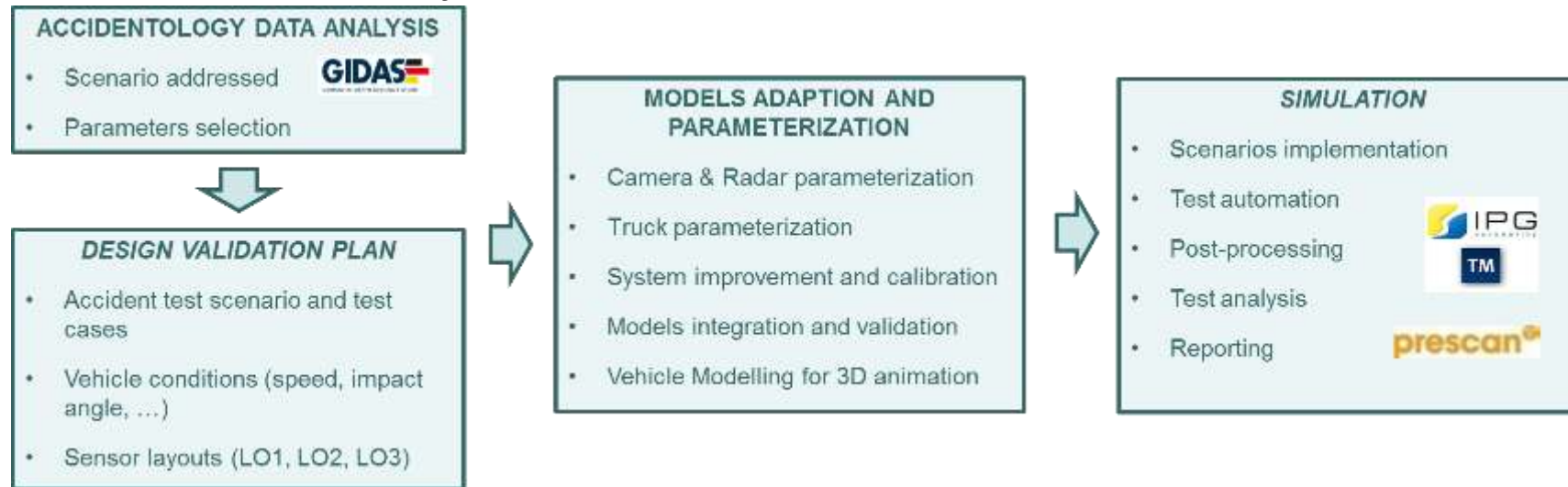
Front End Design and vehicle architecture, Active safety systems

Concept

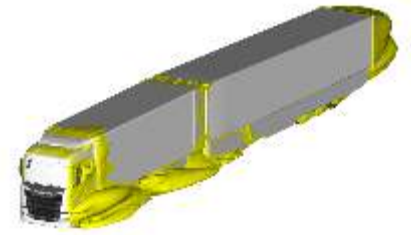
- Following ADAS were virtually installed, configured and tested on the Aeroflex truck in order to bring more safety:
 - Automated Emergency braking (AEB)
 - Side guard warning (SGW)
 - Line support system (LSS)

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 "



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 -

Agenda Part 2




14:00h Opening Session:

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~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)

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