PROJECT MONITORING AND EVALUATION: DRAFT DESIGN OF A MULTI-DISCIPLINARY IMPACT ASSESSMENT AND PUBLIC-PRIVATE PARTNERSHIP FRAMEWORK FOR THE EMS2 TRIAL IN THE NETHERLANDS

Robbert Janssen (TNO) | 23.01.2020 | EMS2 Mini symposium |Helsinki

OUTLINE

Introduction TNO

Research topics around the SuperEcoCombi initiative (EMS2)

Example methodologies for multi-disciplinary impact assessment
- environmental, traffic safety, infrastructure, human factors and user acceptance

Introduction CATALYST Living Lab
- public-private partnership foundation/framework

Questions we have for other experiences with EMS2 applications

- How is the impact assessment (project monitoring) usually organized?
- Which research domains/topics are prioritized when researching the impact of EMS2 in your countries?
- Which findings were really surprising or counter-intuitive?
- Which parties are working together/subcontracted for the project monitoring/impact assessment?
- What are typical monetary budgets for research activities per domain/topic, summed across years?
- Are there drivers/incentives (tax reductions, subsidies) present for industry/market parties to cooperate in research projects or project monitoring?
- How are market parties (transport companies, shippers etc.) contributing to research projects – what are they bringing in / are they co-financing?


TNO innovation for life
TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the well-being of society in a sustainable way.

SMART SOLUTIONS FOR CLIENTS & PARTNERS

KNOWLEDGE TRANSFER

Knowledge exploitation by spin-offs, licences, in partnership with other companies

DEVELOP FUNDAMENTAL KNOWLEDGE

Together with universities

KNOWLEDGE APPLICATION

Contract research for and with clients

KNOWLEDGE DEVELOPMENT

In public-private partnership with partners from the golden triangle

PARTNERS & CLIENTS

TNO END OF 2018

4.39
CUSTOMER SATISFACTION

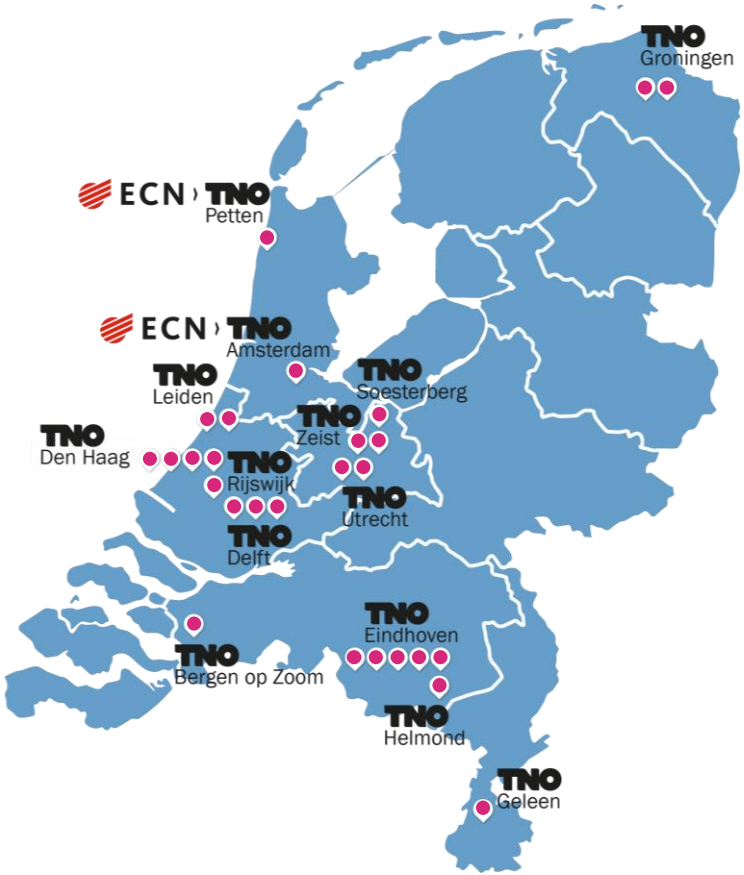
4,800+
PROJECTS A YEAR

2,500+
COMPANIES

2,900+
RESEARCHERS

LOCATIONS IN THE NETHERLANDS

CHECK OUT ON TNO.NL



LOCATIONS

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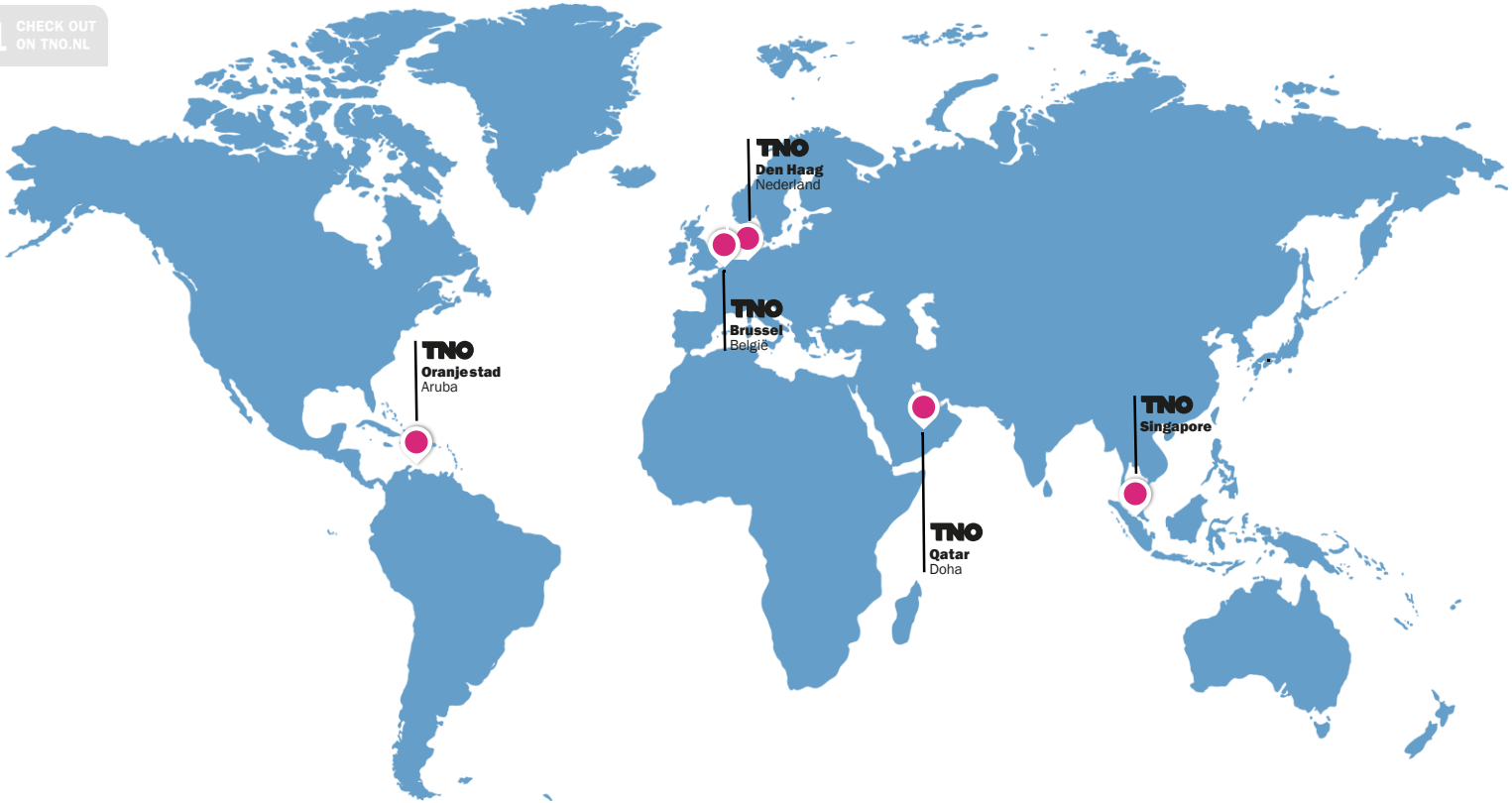
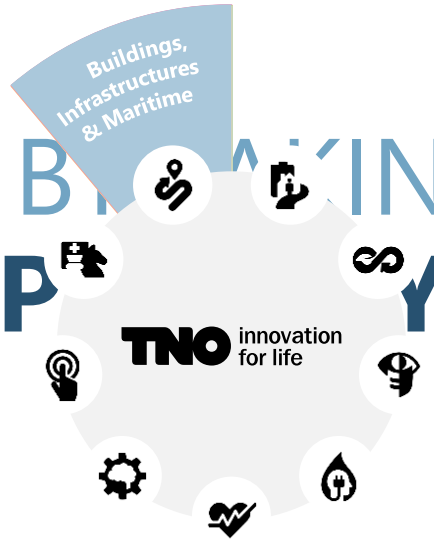


WE DO THIS BY TAKING A
MULTIDISCIPLINARY APPROACH

WE DO THIS BY MAKING A **MULTIDISCIPLINARY** APPROACH



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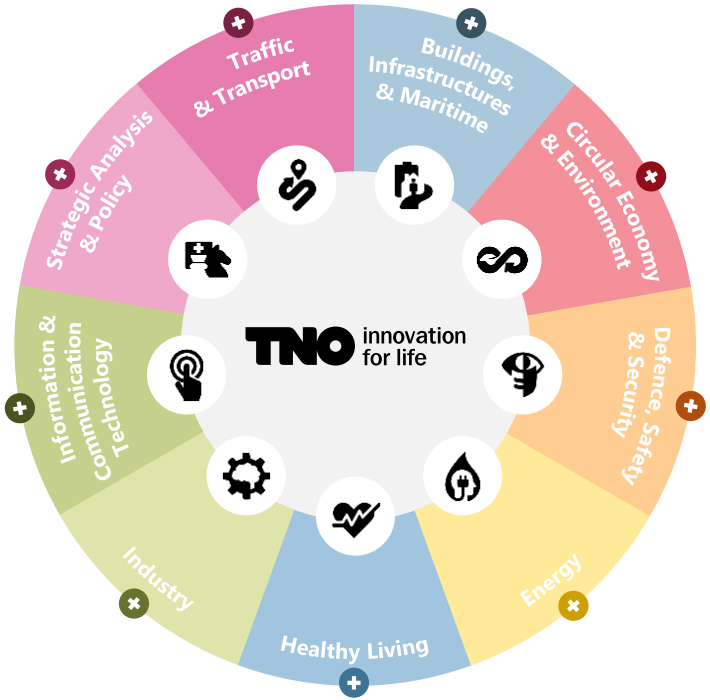
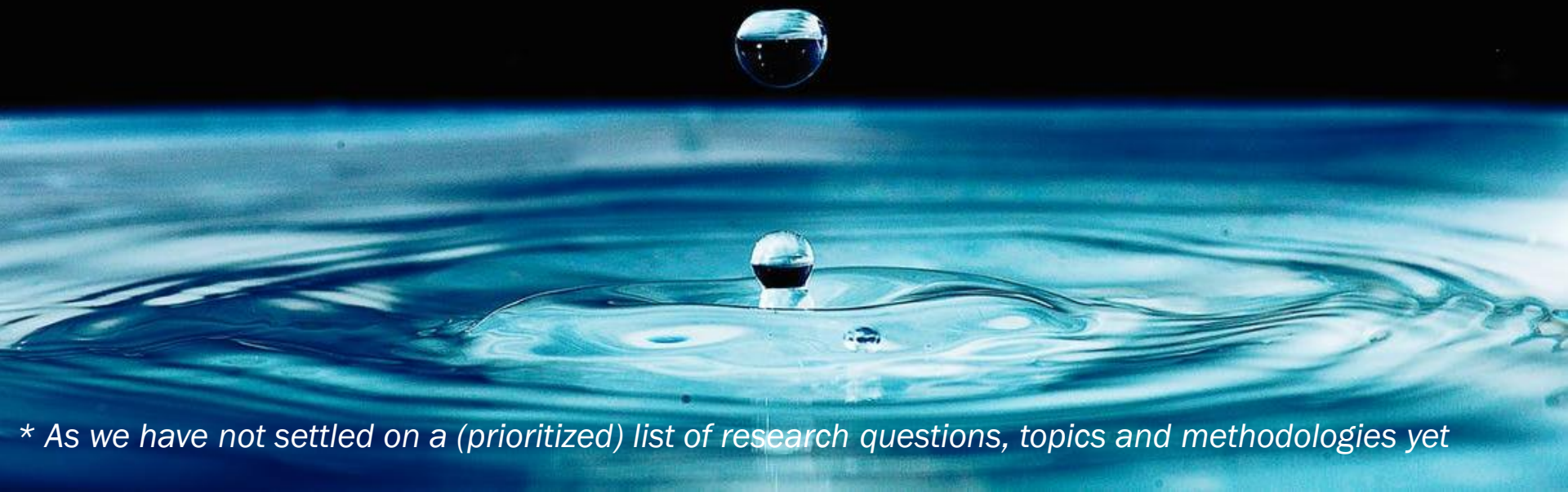


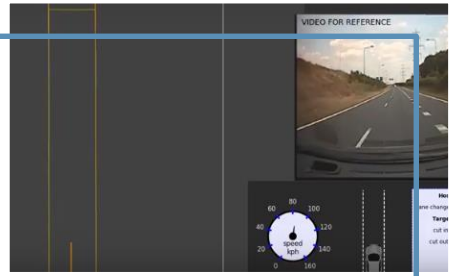
RESEARCH TOPICS AROUND THE SUPERECOCOMBI INITIATIVE (EMS2)



** As we have not settled on a (prioritized) list of research questions, topics and methodologies yet*

SOME POTENTIAL TOPICS FOR IMPACT ASSESSMENT – MULTI-DISCIPLINARY APPROACH

Vehicle safety



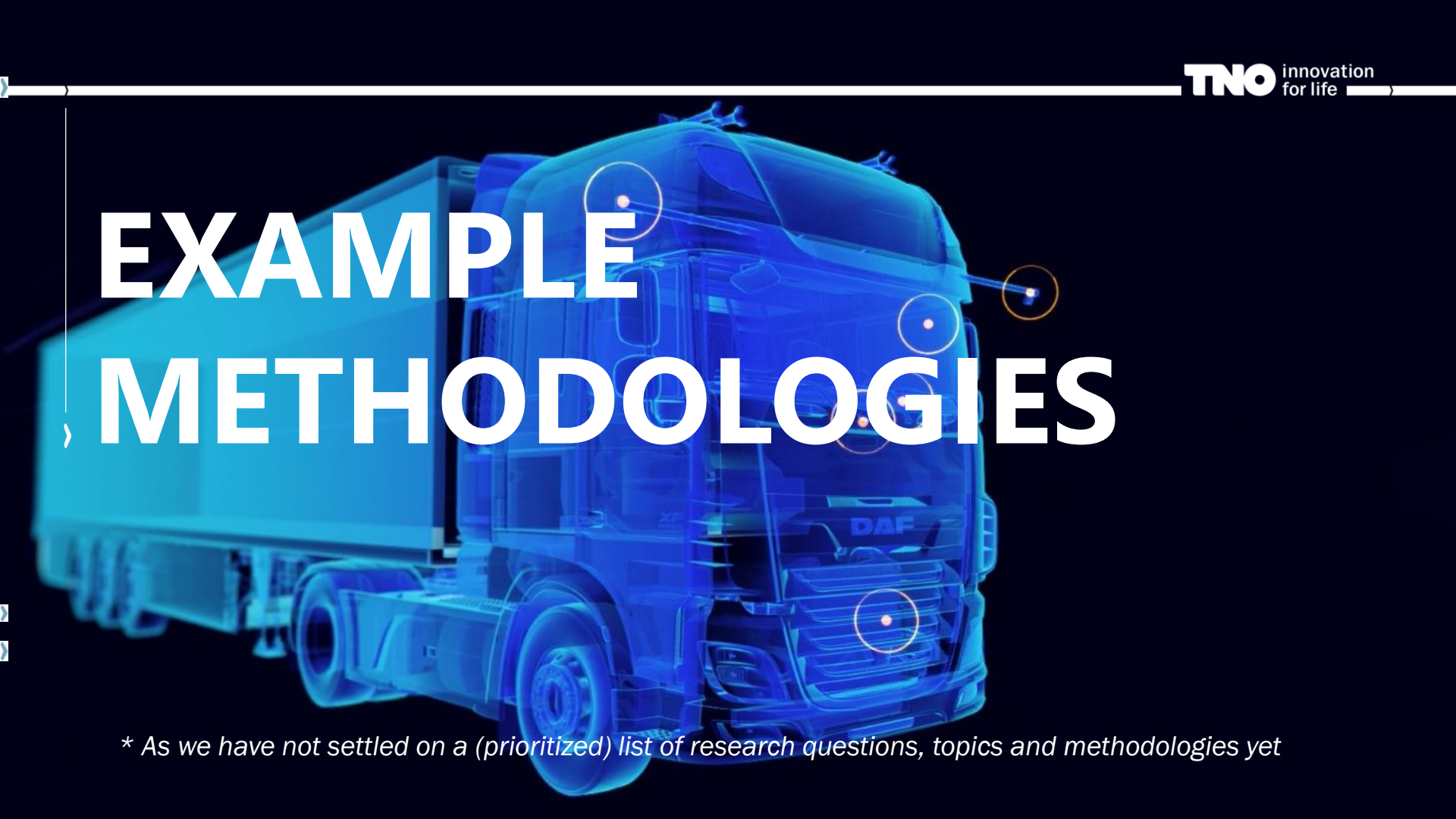
Traffic and road safety

Infrastructure

Driver behaviour

Traffic flow

Fuel consumption and emissions



EXAMPLE METHODOLOGIES

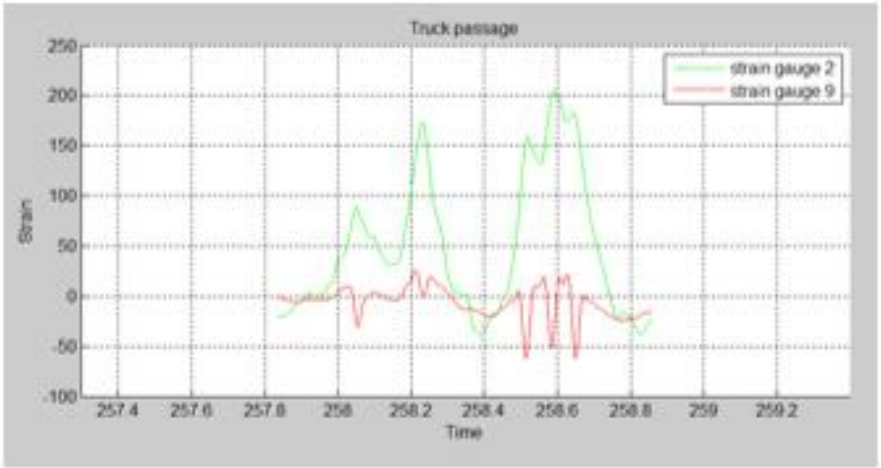
** As we have not settled on a (prioritized) list of research questions, topics and methodologies yet*

IMPACT ASSESSMENT ON PHYSICAL INFRASTRUCTURES

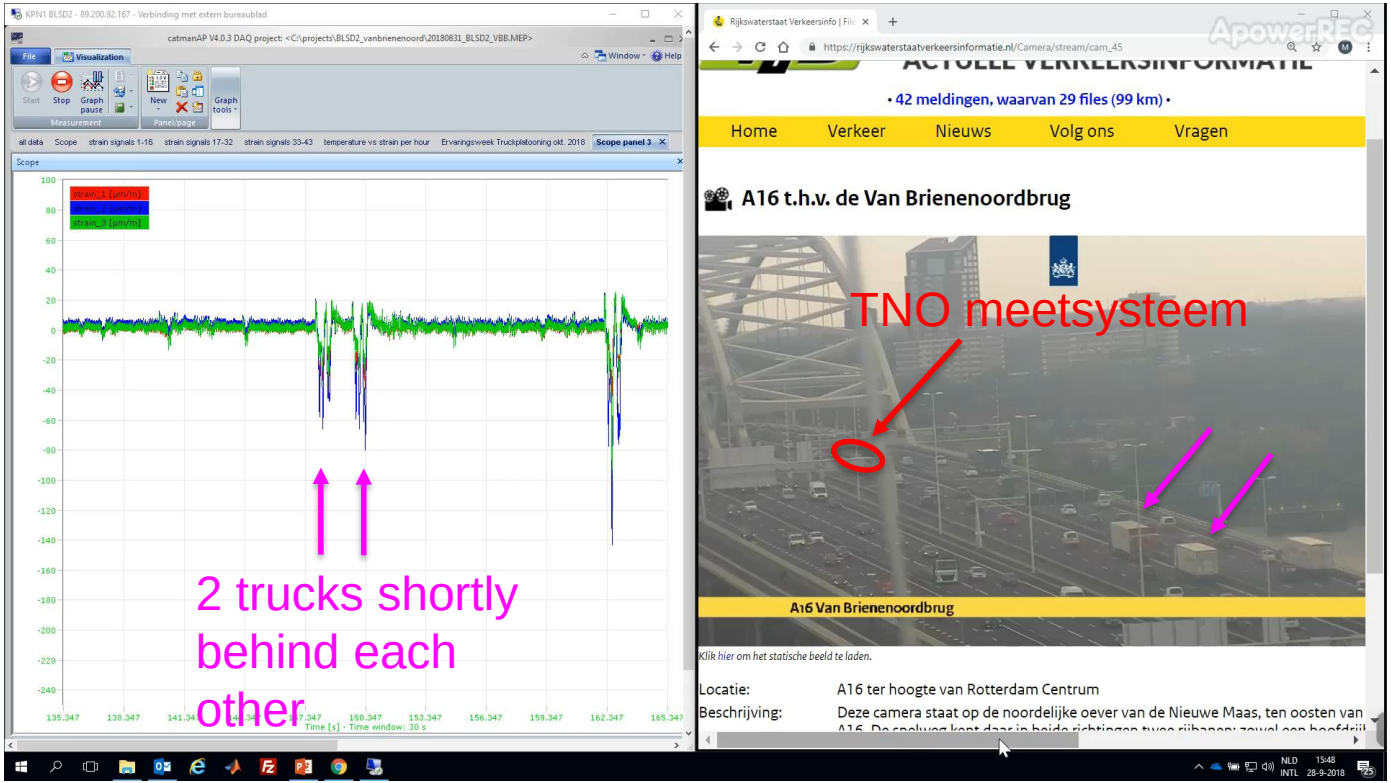
TNO innovation for life

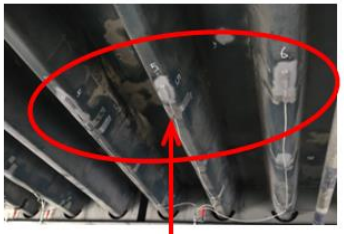
Strain gauge measurements

(example: 2nd Van Brienenoordbrug – Rotterdam)



RECOGNIZING PLATOONS (VEHICLES, AXLES, (WEIGHTS)) FROM BRIDGE MEASURMENTS, HOW?



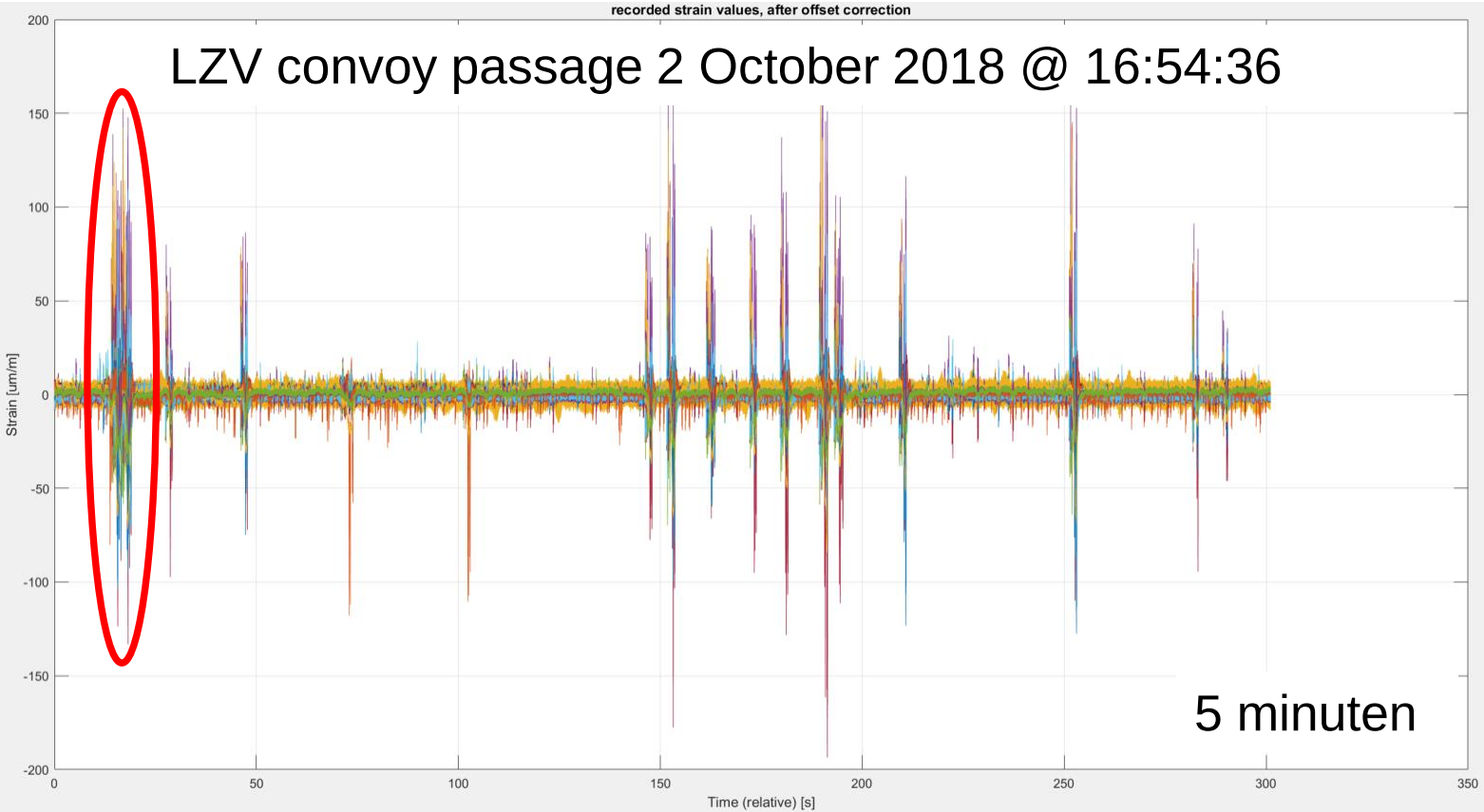


Screenshot
TNO measurement, VID traffic-cam

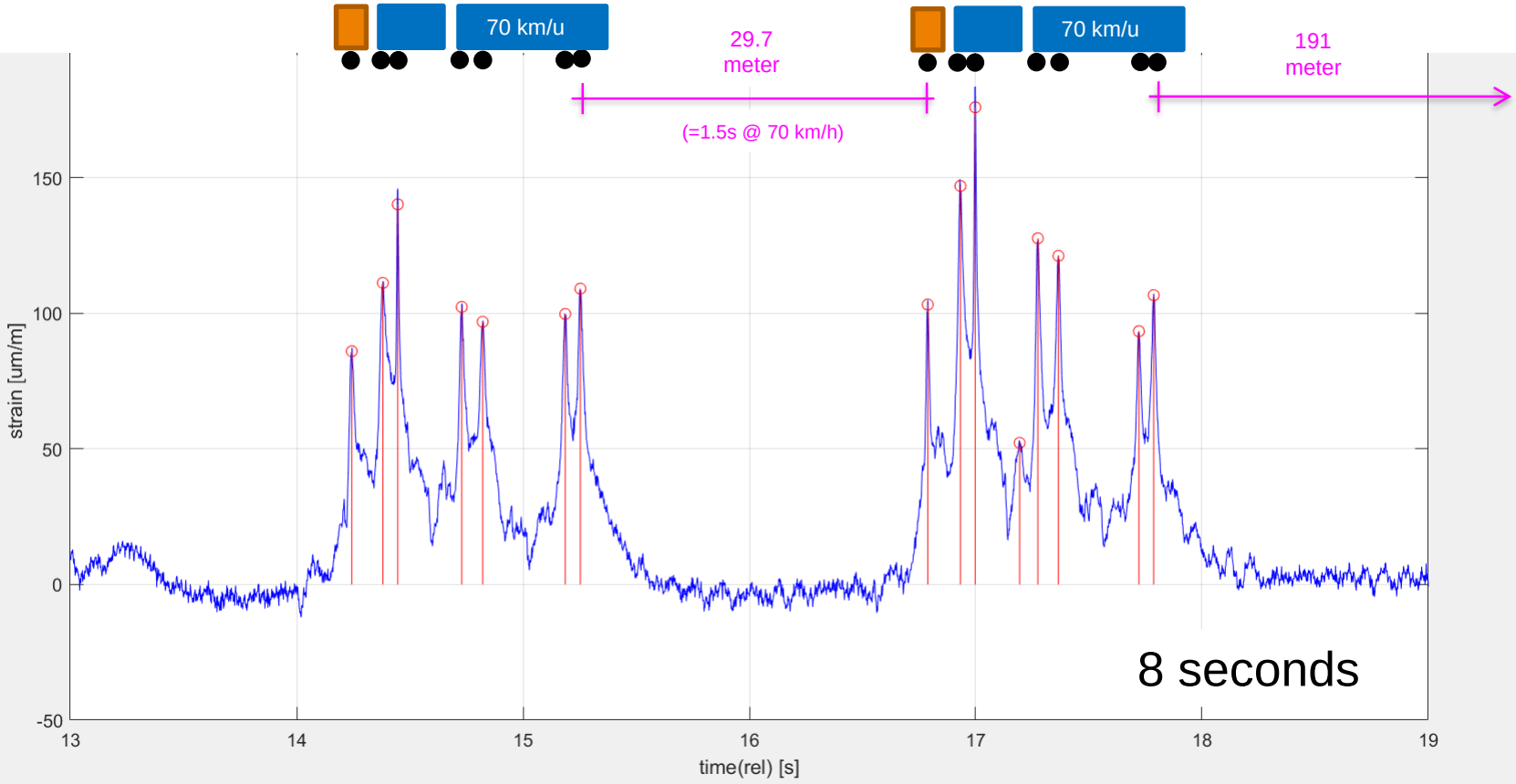
Please note:
VID traffic cam is a little behind


Dual-Trailers in Europe: SuperEcoCombi in NL

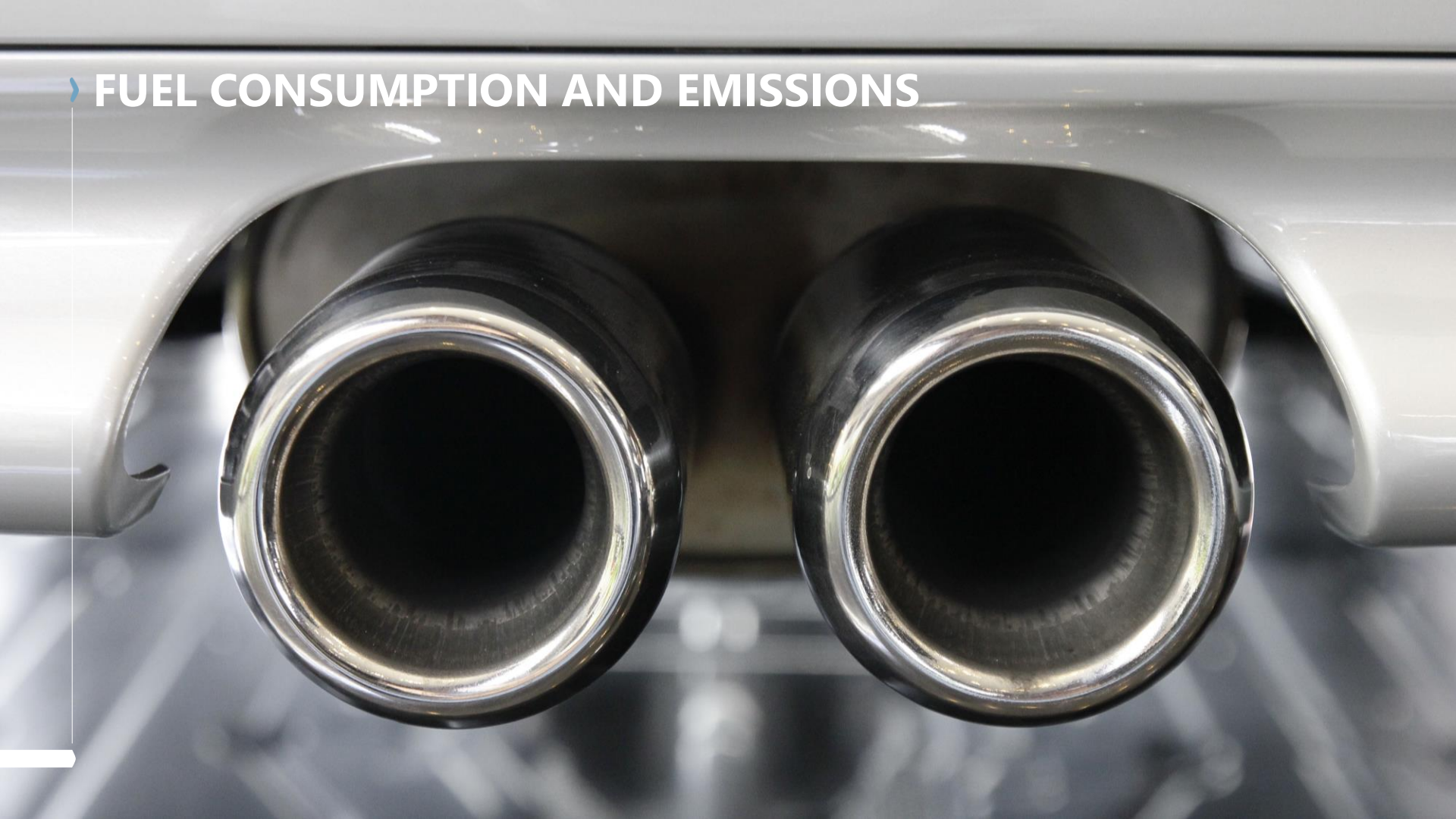
Example: raw data from strain gauge sensors



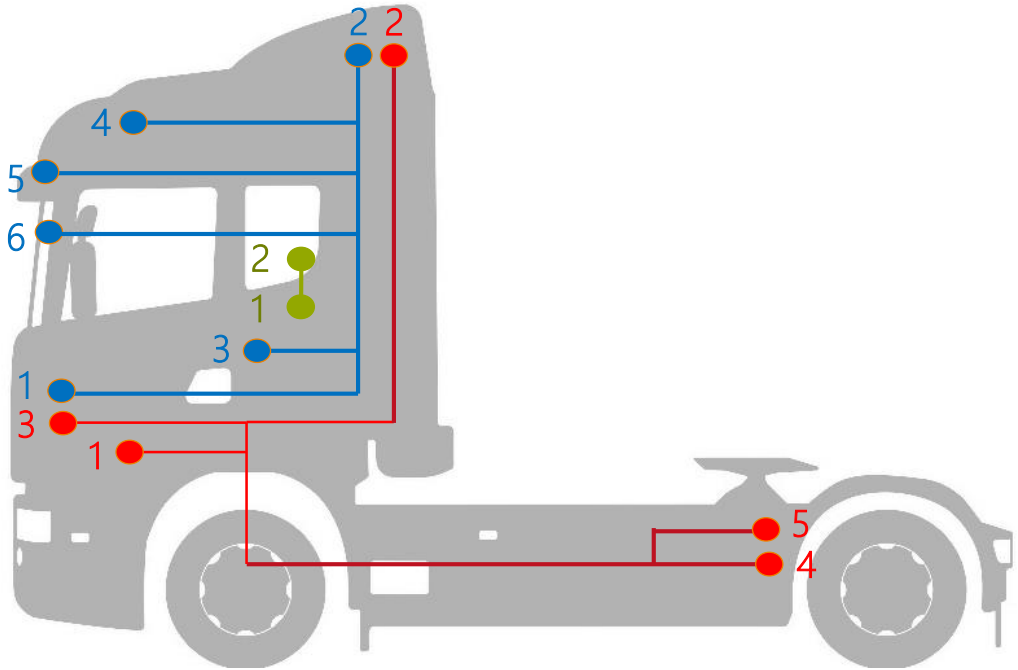
Example: processed/analysed measurement data



FUEL CONSUMPTION AND EMISSIONS



TYPICAL APPROACH: VEHICLE INSTRUMENTATION



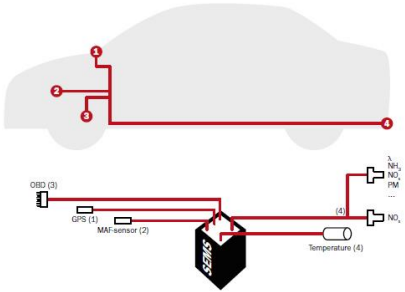
SEMS
CAN (1)
GPS (2)
Pressure sensors (3)
Temperature sensor (4)
Exhaust sensors NOx, O2, NH3 (5)

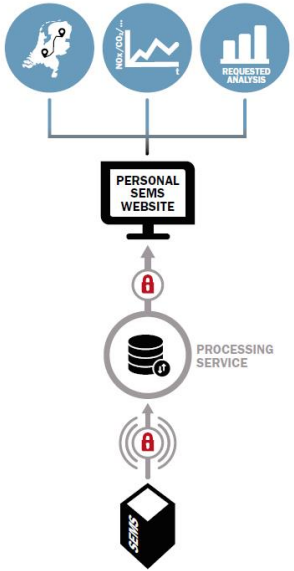
Advantech
CAN (1)
GPS (2)
Accelerometer (3)
Cameras (4)
Microphone (5)
Mobile Eye (6)

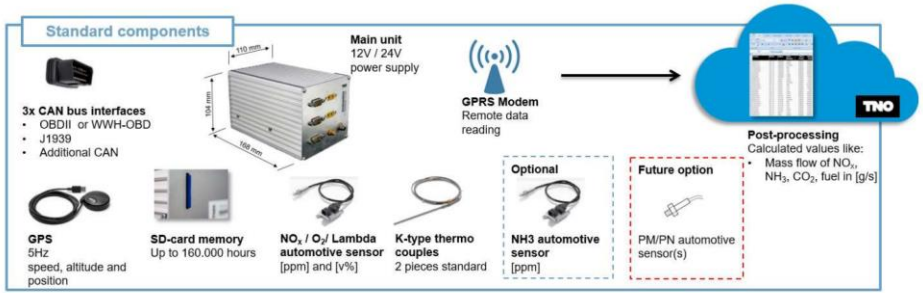
Fitbit
GPS (1)
Heart rate (2)

LONGER DURATION EMISSION MEASUREMENT:
SEMS (SMART EMISSION MEASUREMENT SYSTEM)

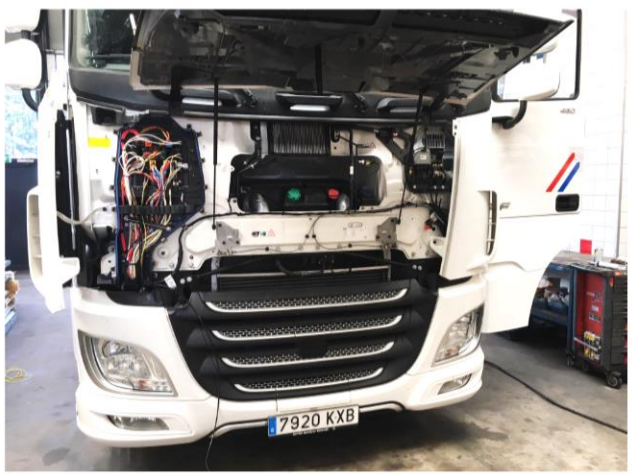
AFFORDABLE & EASY TO INSTALL
REAL WORLD SMART EMISSIONS MEASUREMENT SYSTEM (SEMS)



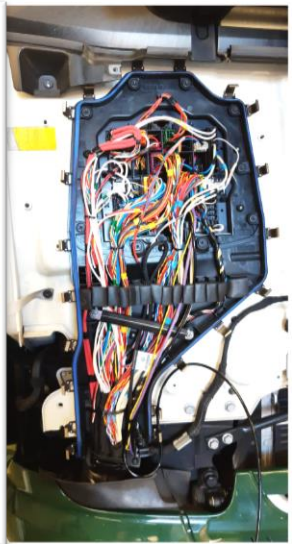





VAN DER SLOT
DAF


7920 KXB


DAF




DAF


Overbeek
88-BLD-6


TNO
JD-504-D

› USERS / DRIVER ACCEPTANCE / TRAFFIC SAFETY AND IMPACT

HUMAN FACTORS DATA: VIDEO, OBSERVATIONS, SURVEYS, ETC

- Camera's
  - Dashcam
  - Eye position / distraction
  - Headway distance
  - Feet at/near the pedals
  - What happens around the vehicle
  - Etc.
- Observations
- Heart rate monitors
- Surveys, focus groeps, interviews
- Et cetera

FOCUS GROUPS, SURVEYS, INTERVIEWS

SOME POTENTIAL TOPICS FOR IMPACT ASSESSMENT – MULTI-DISCIPLINARY APPROACH


Vehicle safety


Traffic and road safety


Infrastructure


Driver behaviour


Traffic flow

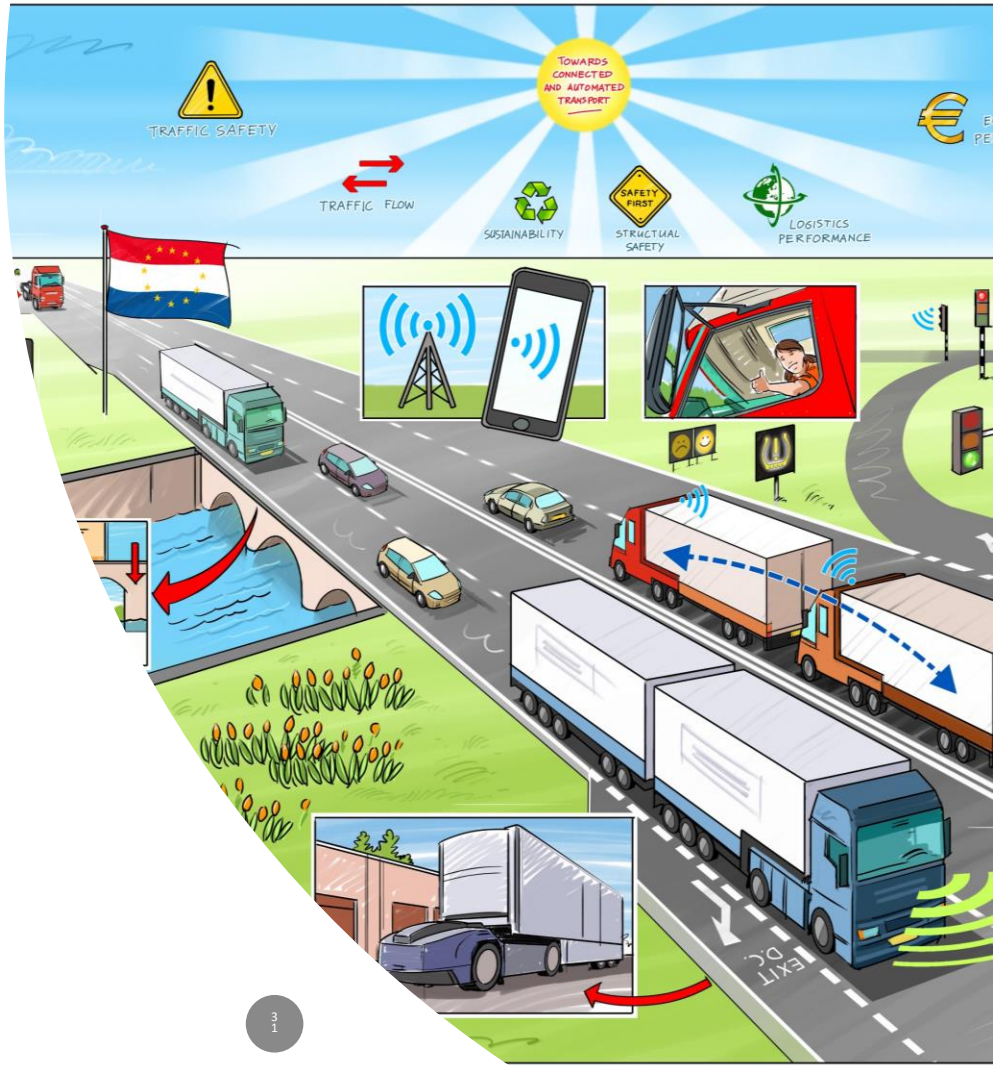

Fuel consumption and emissions

But also consider:

- Cyber security
- Compliance (overloaded vehicles, data exchange etc)
- Logistics (supply chain integration)
- Macro-economic (volume potential, multimodality, competiveness, societal cost-benefit analysis)
- … and many other topics

CATALYST LIVING LAB

[BRIEF INTRODUCTION]



Living Lab CATALYST

Connected and Automated Transport Living Lab

Connected Automated Transport And Logistics Yielding SustainabiliTy

The CATALYST Living Lab is part of the Sustainable Living Labs programme co-financed by the Dutch Research Council (NWO), the Ministry of Infrastructure and Water Management, the Taskforce for Applied Research (SIA) and the Topsector Logistics.

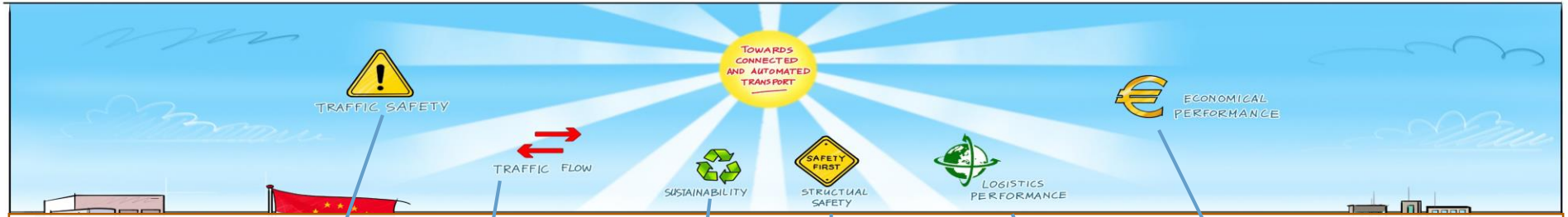
Topsector Logistiek

Ministerie van Infrastructuur en Waterstaat

TKI DINALOG
Dutch Institute for Advanced Logistics

NWO

SIA
Regieorgaan



EU: 25.000 traffic casualties per year
NL: 600 casualties per year and increasing
NL: 13-15B euro cost per year

NL: 45% congestion increase to 2021
NL: 2.3-3.7B euro cost per year
Freight traffic percentage is 9-20% depending on corridor (0.7B euro freight)

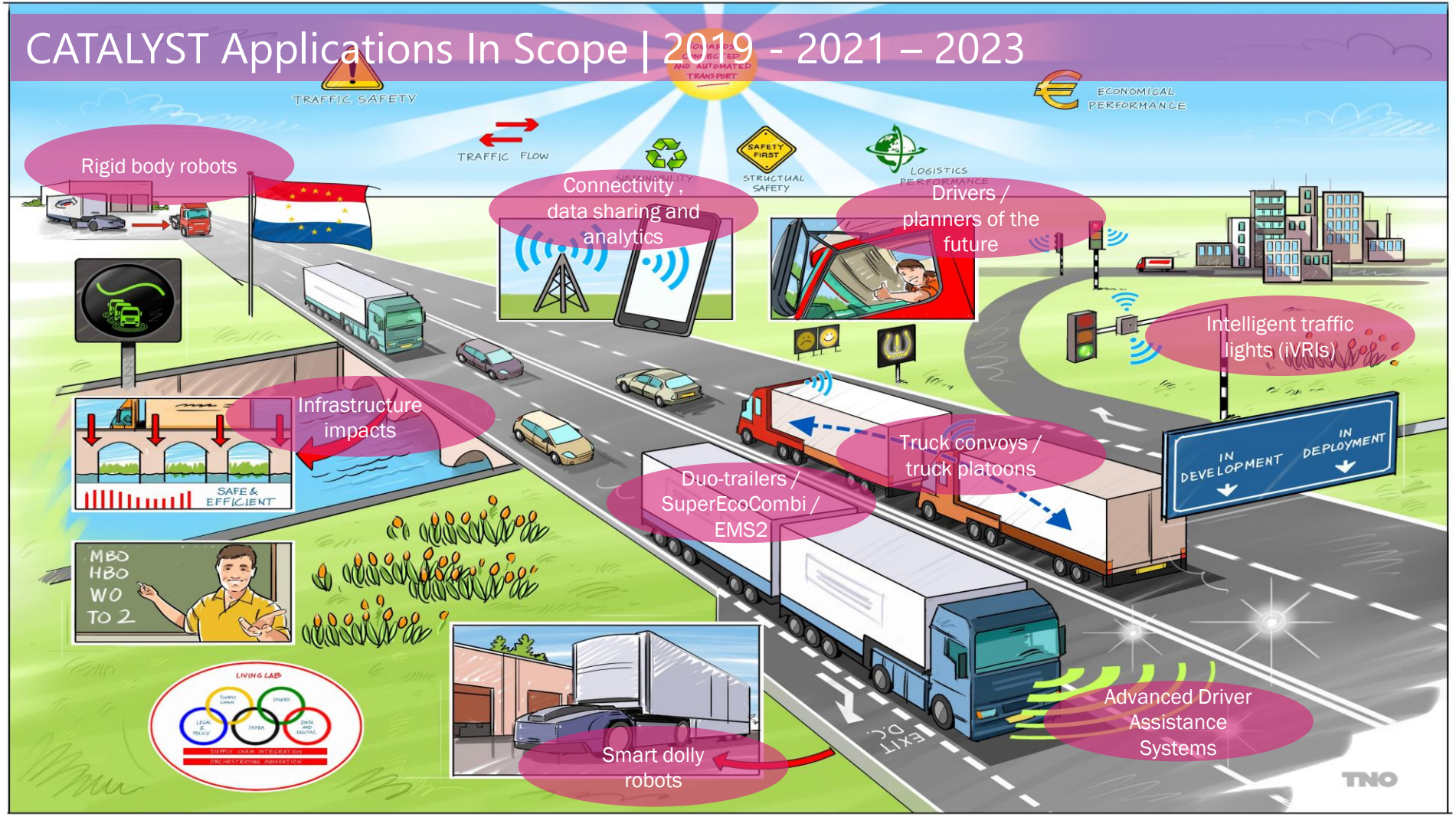
EU: Paris Climate Agreement → heavy-duty transport ~25% CO_2 of all transport emissions)

EU: +1.1% freight volume per year until 2050 (with GDP)
EU: 70% road transport share until 2050
NL: #1 readiness for Connected Automated Driving

NL: towards #1 on Logistics Performance Index (LPI)
NL: significant driver shortage (646.000 jobs)

NL: Ageing civil infrastructures (~100M EUR per year maintenance). Huge replacement act coming up, ~3500 bridges and viaducts

CATALYST Applications In Scope | 2019 - 2021 – 2023



CATALYST

Connected Automated Transport and Logistics Living Lab | 25.09.2019

CATALYST partnership

CATALYST supporters

Broad and strong *kick-off* consortium – mix of public and private with very significant committed contributions

Governments, authorities	Private companies	Representative bodies, branche organizations	Knowledge, research and education
8	14	8	7

Summary of Living Lab program budget	
Total program budget	**~ 3.285.000 EUR**
Financing of public bodies	**~ 1.800.000 EUR**
Financing of Topsector Logistics / IenW / SIA	~ 960.000 EUR
Financing of NWO	~ 840.000 EUR
Co-financing committed by industry partners	**~ 1.090.000 EUR**
- In cash	~ 595.000 EUR
- In kind	~ 495.000 EUR
Co-financing by TNO	**~ 395.000 EUR**

CATALYST

Connected Automated Transport and Logistics Living Lab | 25.09.2019

CATALYST partnership

CATALYST supporters

4 SEC-combinaties nú aanwezig in Nederland

SEC entrants (new memberships) to CATALYST Living Lab

(at 15.01.2020)

- DAF Trucks NV
- Getru Bedrijven
- Koeltrans
- JA Nap Transport
- Peter Appel Transport
- Scania Benelux
- TLN
- Van der Wal Transport

- Post-Kogeko
- Volvo Trucks
- Krone Trailers

SUMMARY

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