CATALYST LIVING LAB: CONNECTED AND AUTOMATED TRANSPORT RESEARCH IN THE NETHERLANDS

Swiss Mobility Arena Automaticar

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TNO innovation for life

OUTLINE FOR TODAY

1. Short intro TNO

2. Why innovations in road transport?

3. Living Lab CATALYST

4. CAT research in CATALYST

‘INNOVATION FOR LIFE’

TNO THE NETHERLANDS ORGANIZATION FOR APPLIED SCIENTIFIC RESEARCH

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.
THIS IS OUR MISSION AND IT IS WHAT DRIVES US, THE OVER 3,400 PROFESSIONALS AT TNO, IN OUR WORK EVERY DAY!

SMART SOLUTIONS FOR CLIENTS & PARTNERS

KNOWLEDGE TRANSFER

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

DEVELOP FUNDAMENTAL KNOWLEDGE

Together with universities

CLIENTS & PARTNERS

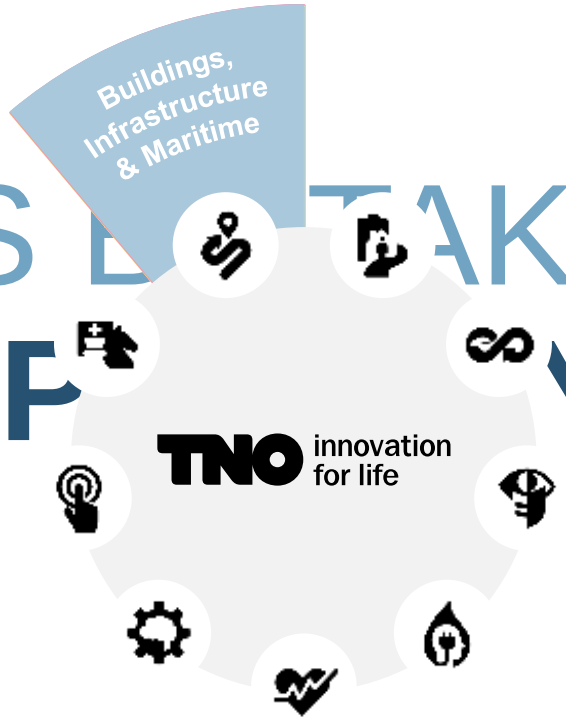
KNOWLEDGE APPLICATION

Contract research for and with clients

KNOWLEDGE DEVELOPMENT

In public-private partnership with partners from the golden triangle

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



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ENVIRONMENTAL AND SOCIETAL CHALLENGES PRESSING NEED FOR INNOVATION

Traffic Safety

- EU: ~25.000 casualties in traffic per year Eurostat
- EU: Vision Zero 2050
- NL: ~ 600 per year CBS

Traffic flow and accessibility

- Costs of accidents NL 15,8-18,6b EUR; Costs of congestion NL 3,3-4,3b EUR SWOV
- Freight traffic percentage is 9-20% depending on corridor (0.7B euro freight)

Sustainability

- Paris Climate Agreement 2015 and EU Green Deal: 55% GHG emission reduction by 2030
- Dutch Climate Agreement 2019: 30% CO2 reduction by hinterland logistics in 2030. Klimaatakkoord

Ageing infrastructure

- NL: Ageing civil infrastructures (TNO ~1b EUR per year maintenance). Huge replacement act coming up, ~3500 bridges and viaducts.
- I2V possibilities opening up.

Logistics top priority

- EU: +1.1% freight volume per year until 2050 (GDP)
- EU: 70% road transport share until 2050
- NL strives for #1 on Logistics Performance Index
- Logistics Human Capital (serious driver shortages)

Netherlands readiness

- NL: #2 readiness for Autonomous Vehicles Readiness Index (KMPG, 2020)
- Smart Mobility, Dutch Reality

CATALYST LIVING LAB

CURRENT RESEARCH ON CAT IN THE NETHERLANDS

- CATALYST develops and accelerates Connected Automated Transport (CAT) innovations for **safer, more efficient and sustainable heavy-duty road transport.**
- CATALYST is a multi-party public private partnership (PPP) coordinated by TNO.
- The CATALYST Living Lab is a **community, knowledge hub** and applied research programme for improving safety, efficiency and sustainability aimed at the logistics sector. We do this by:
  - Developing Connected Automated Transport (CAT) innovations for heavy road transport, testing and improving them using **simulations and practical experiments**.
  - **Identifying and defining conditions** and requirements of CAT for a successful implementation in logistics practice and determine transition paths for CAT.
- Want to know more? Then take a look at our website: www.catalystlab.nl

LIVING LAB: WHAT'S IN A NAME

Living Lab

"A test environment for **cyclical development** and evaluation of complex, innovative concepts and technology, as part of a real-world, operational system, in which **multiple stakeholders** with different background and interest work together towards a **common goal**, as part of medium to long-term study."

HOW IS THAT DIFFERENT?

Projects, demonstrations	Living Labs
Characteristics	
Limited Joint Knowledge Production	High **Joint Knowledge Production**
Simple	Complex
Linear development	**Iterative**, cyclical development
Predetermined	Learning effects and improvemetns during activities
Individual values	Shared values
Single actor as driver and owner	**Multi-stakeholder** and collaborative governance
Little uncertainty	Deep uncertainty
Short to medium term orientation	**Medium to long term orientation**
Reactive planning and steering	**Adaptive** and proactive planning and steering
Purpose	
Closed research and development	Open innovation
Analysis for single actor	Analysis for multiple actors

- Adapted from: Quak, H., Lindholm, M., Tavasszy, L., & Browne, M. (2016). From freight partnerships to city logistics living labs–Giving meaning to the elusive concept of living labs. *Transportation Research Procedia*, *12*, 461-473.

CATALYST Living Lab – partners and supporters

Connected Automated Transport and Logistics Living Lab

CATALYST

Topsector Logistiek | Ministerie van Infrastructuur en Waterstaat | TKI DINALOG Dutch Institute for Advanced Logistics | NWO | Regieorgaan SIA

CATALYST PARTNERSHIP

Knowledge institutes and universities

TNO innovation for life | RSM Erasmus University | University of Applied Sciences | Technische Universiteit Eindhoven University of Technology | Hogeschool van Arnhem en Nijmegen | Universiteit Twente.

Sector organizations and governmental organizations

Sectorinstituut Transport en Logistiek | TLN | LIOF | Rijkswaterstaat Ministerie van Infrastructuur en Waterstaat

Port authorities

Provincie Zeeland | North Sea Port | Port of Rotterdam | Gemeente Rotterdam | Smart Port | Port of Moerdijk

Transporters and shippers

DHL | dpd | Jan de Rijk Logistics | Ewals Cargo Care | Cornelissen Groep | DJMiddelkoop | Koeltrans BV | DIJCO | here

MAP | Vos Logistics | GVT Group of Logistics | t. nagel b.v. transportbedrijf | Overbeek | Simon Loos | Van der Slot Transport | Distribute | VDH The Freight Managers

OEMs

DAF | Scania | Volvo | TRTA

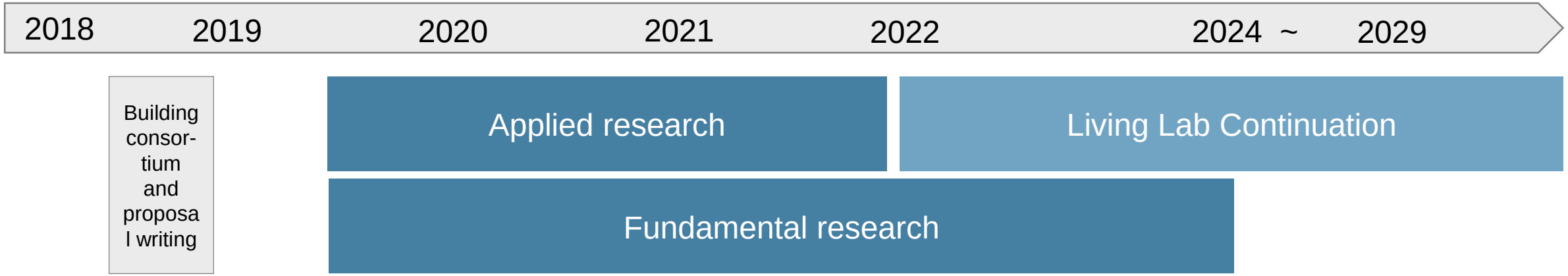
Krone | Getru Bedrijven | Peter Appel Transport | Jumbo | van der Wal | DLG

CATALYST supporters

talking logistics | Intelligente Infra | ACN | Innovation Quarter | FNV

DEVELOPMENT OF LIVING LAB AS COLLABORATIVE LEARNING COMMUNITY

COMBINATION OF APPLIED AND FUNDAMENTAL RESEARCH



COLLABORATION WITHIN CATALYST

CATALYST board meeting	• Representatives of various stakeholder groups (University, Port Authority, Transporter, Shipper) • Monitoring Living Lab progress, agenda setting and critical review • Meeting every 8 weeks
Knowledge partner meeting	• Universities, Universities of Applied Sciences, TNO • Indepth knowledge exchange, linking PhD and MSc research projects • Meeting every 6-8 weeks
Consortium	• All partners • Share (intermediate) living lab results, exchange knowledge on related projects/ developments • Consortium meetings (every 3 months) and webinars (company visits)

CATALYST Applications in scope | 2019 – 2022 – 2024 - 2029

CONNECTED AUTOMATED TRANSPORT INNOVATIONS

ADAS and Truck Platooning

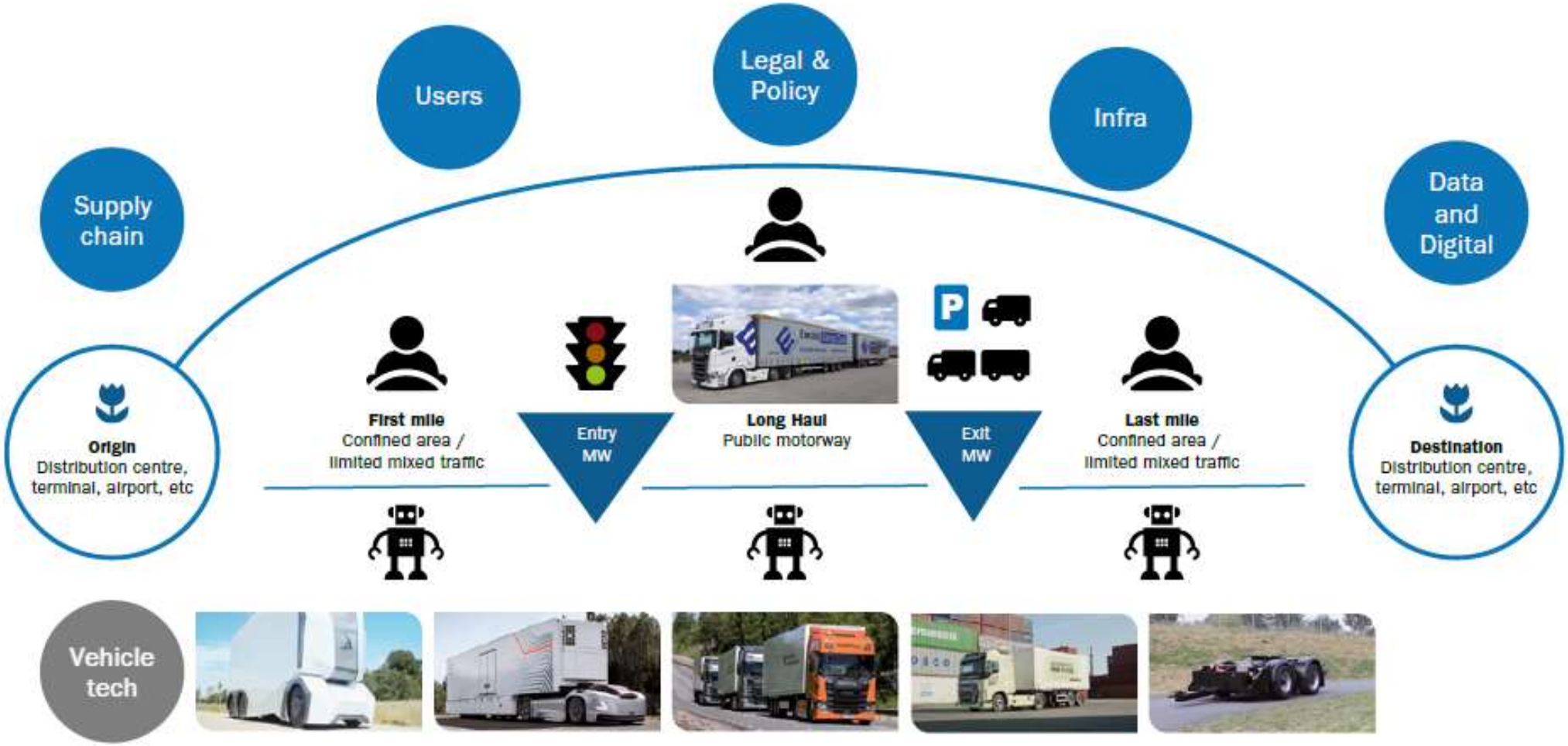
Autonomous vehicles at yards

Intelligent Traffic Light Controllers

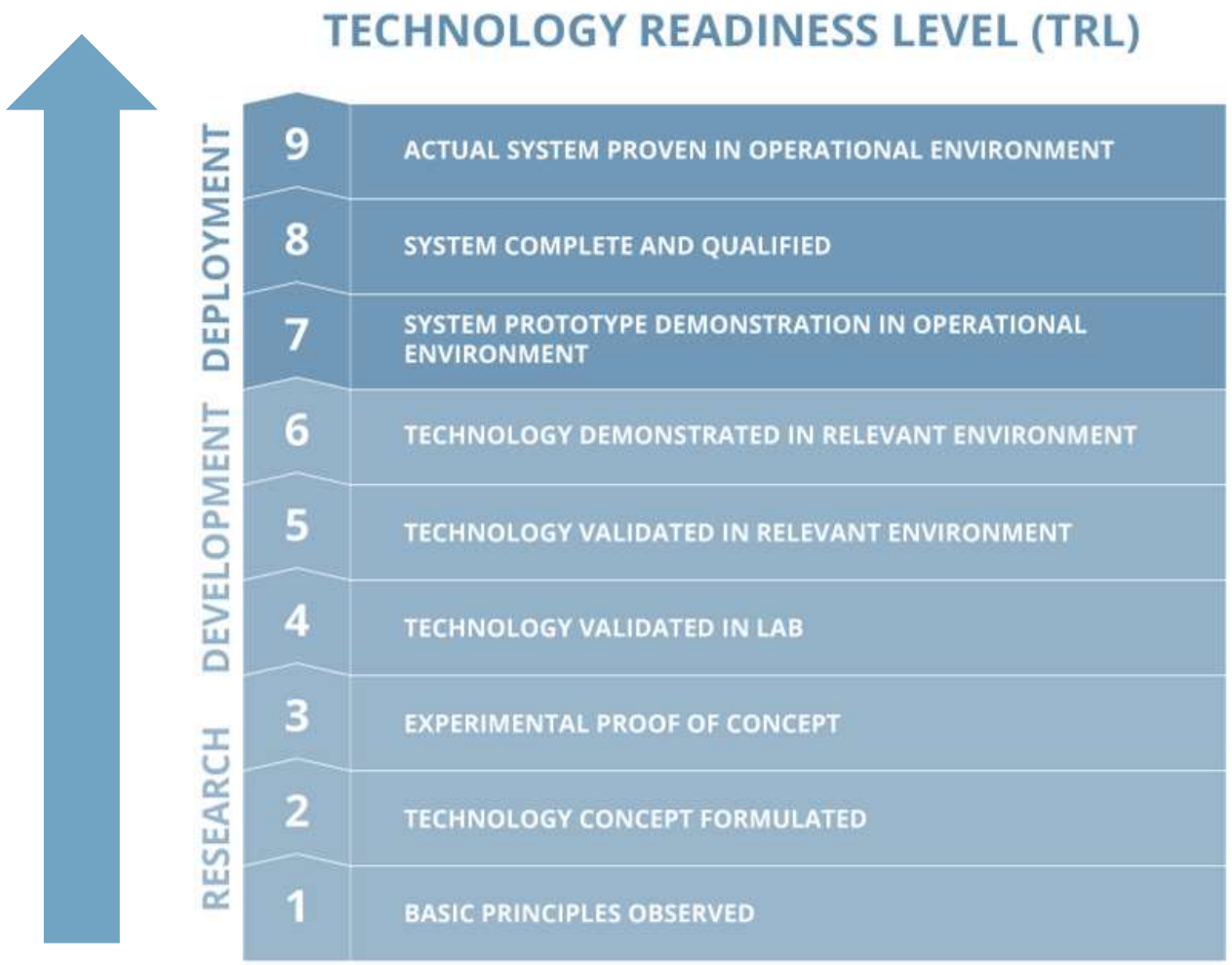
Super EcoCombi (SEC)

TOWARDS DEPLOYMENT OF CONNECTED AUTOMATED TRANSPORT

A MULTI DISCIPLINARY CHALLENGE



MATCHING TECHNOLOGY READINESS LEVELS WITH LIVING LAB ACTIVITIES



Monitoring real-world operations

Practical experiments

Simulation

MATCHING TECHNOLOGY READINESS LEVELS WITH LIVING LAB ACTIVITIES

CAT concepts on corridors

Medium TRL (3-5)

Real-world monitoring of:

- Advanced Driver Assistance Systems (ADAS) – ACC convoy driving
  - Fuel consumption, Driver acceptance, Logistics integration
- Intelligent Traffic Lights (iVRI's)
  - Fuel consumption
- Super Eco Combi
  - Qualitative impact on physical infrastructure
  - Regulatory process

CAT concepts on yards

Low TRL (0-3)

Simulation and preparation of experiments:

- Automated driving on restricted area
- Automated driving in mixed traffic

CAT concepts *social innovation*

- Assessing driver acceptance of new technologies
- Assessing required skills of driver of the future
- Assessing company readiness for innovation through benchmarking
- Inventory of regulatory requirements

CATALYST FOR NEW INITATIVES

YES- Yard Emission monitoring for Sustainability

2021-2022

MAGPIE: sMArt Green Ports project

2021-2025

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LIVING LAB LESSONS

Connected and Automated Transport is expected to contribute to safer and more sustainable road transport

For deployment of CAT we have to look beyond technology : a multidisciplinary approach is required

Collaboration with both public and private partners in the sector strengthens research

Impact assessment contributes to knowledge base and shared understanding

Knowledge hub and catalyst for other initiatives

THANK YOU FOR YOUR ATTENTION

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