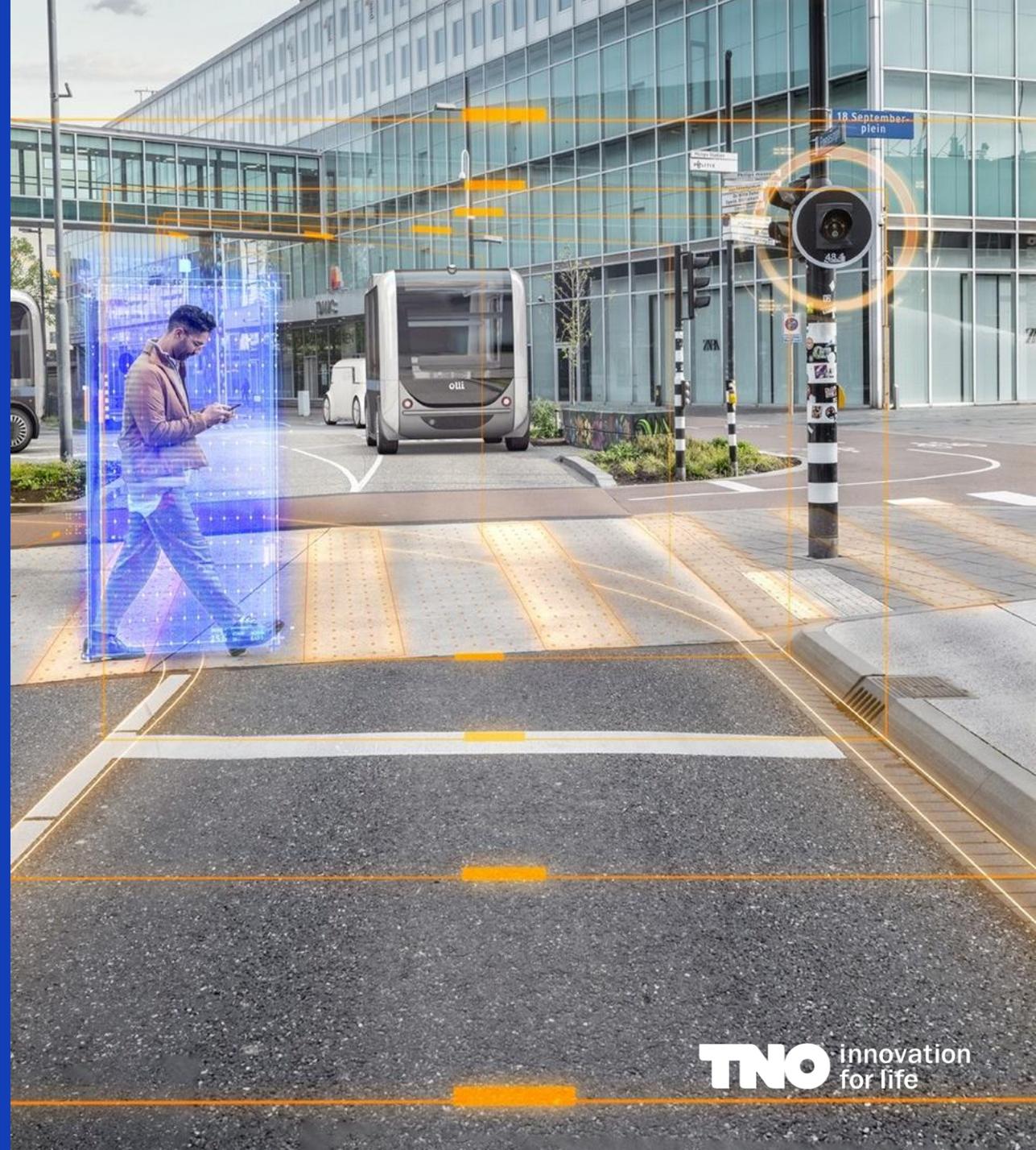# Driving Safety Forward

The need for harmonized scenario-based assessment to accelerate the safe and responsible introduction of Automated Driving

Dr. Olaf Op den Camp | SAKURA Final Event Tokyo

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The Promise of Automation

- Making **mobility accessible to all**: transition to inclusive, sustainable, and affordable transport systems that overcome barriers for elderly, disabled, and diverse populations.

- **Reducing congestion** by optimizing the traffic system and road use.

- Providing a solution for the shortages of **professional drivers** that is disrupting global supply chains and that tend to increase further.
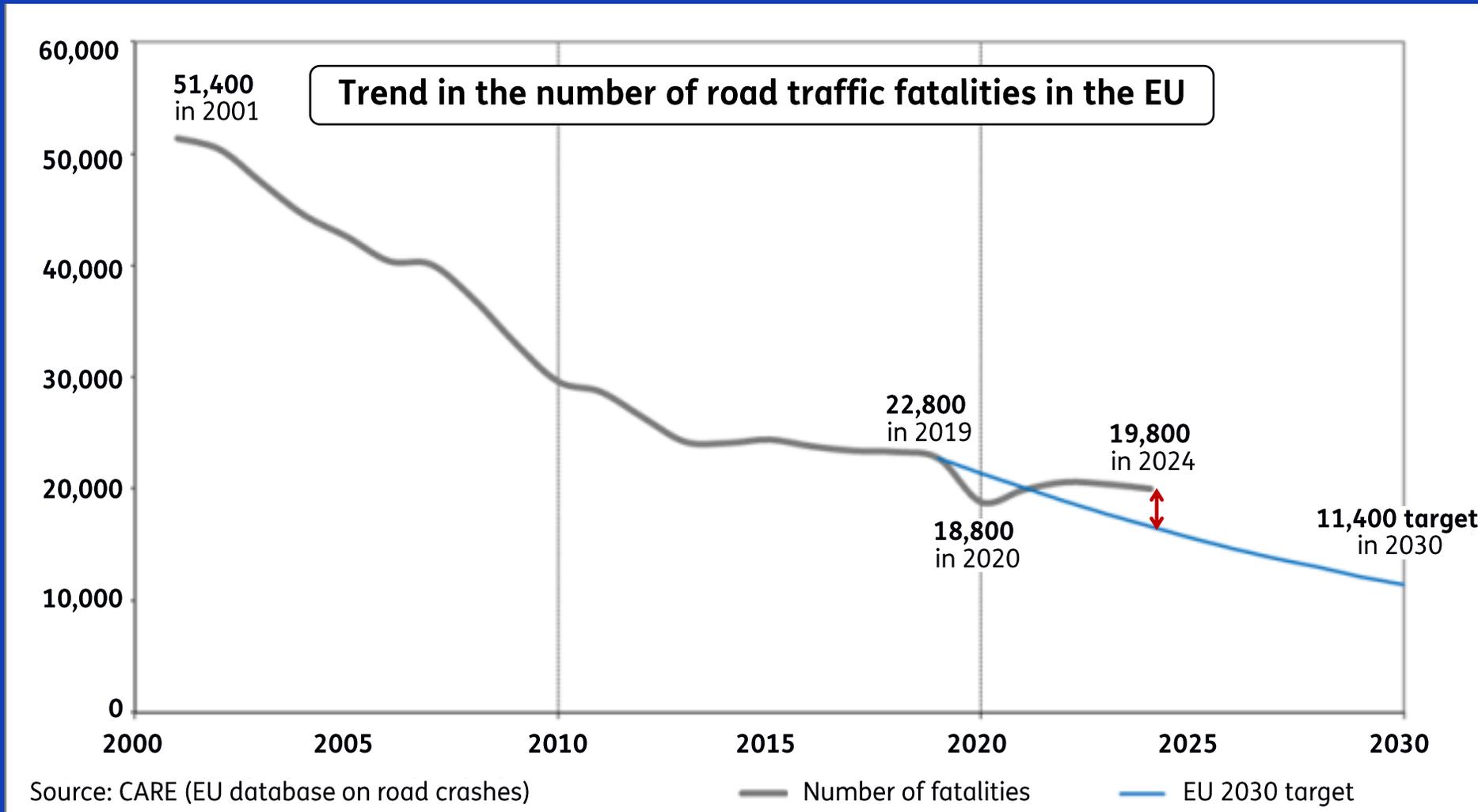
- A significant driver of **high-tech job** creation: e.g. Software & AI Engineering, Data Science & Analysis, IT & Digital Technologies.

- **Improving safety** by reduction of Human Error: Autonomous Vehicles do not get tired, distracted, or impatient.

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Traffic safety

Trend in the number of road traffic fatalities in the EU

51,400 in 2001

22,800 in 2019

19,800 in 2024

18,800 in 2020

11,400 target in 2030

Source: CARE (EU database on road crashes)

— Number of fatalities — EU 2030 target

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One fatality per 200 million driven vehicle kilometres* in The Netherlands in 2024.

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The Challenge

"We have to get autonomous vehicles
on Europe's roads faster"

Ursula von der Leyen (EC President, 3 Oct. 2025, Turin)

- Integrate innovative automated driving systems **into the existing mobility system**.

- Accelerate development and deployment in a **safe and responsible** way.

We are <u>not</u> improving safety by the introduction of autonomous driving.*

We have to ensure that we introduce autonomous driving in a safe and responsible way.

* Autonomous driving = SAE level 4

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Safe and responsible introduction of AD

Governments

- Maintain a safe, healthy, and comfortable living environment for citizens

- Foster economic growth & well-being

- Stimulate innovation

Industries

- Develop good products that do not cause harm
  - Inherently safe
  - Safe in dealing with its environment

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Safe and responsible introduction of AD

Governments

Industries

- Common understanding, speak the same language

- A practical methodology for **safety assessment** that supports both industry and government

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Requirements to the methodology

- Reliable / explainable / understandable – serving the various stakeholders

- Assessment is based on what vehicles encounter in the real world – our public roads

- Capable of dealing with the large differences that exist between countries – regions

- Feasible and as practical as possible – limit required resources

- Not depending on the applied automation and communication technology

These requirements are complex and challenging to meet

*Significant advancements are needed to achieve a **harmonized** methodology*

UNECE New Assessment/Test Method *

- **Scenarios** to describe the **large variety** of situations and conditions that can be encountered.

- Generate Test scenarios for testing:
  - (1) **Virtual testing** using computer simulations
  - (2) **Proving ground testing**
  - (3) **Real-world testing** on the road

- (4) **Audit** of process, tools and results

- (5) **In-service monitoring and reporting (ISMR)**:
  - Early detection of undesired behaviour
  - Identify unknown scenarios
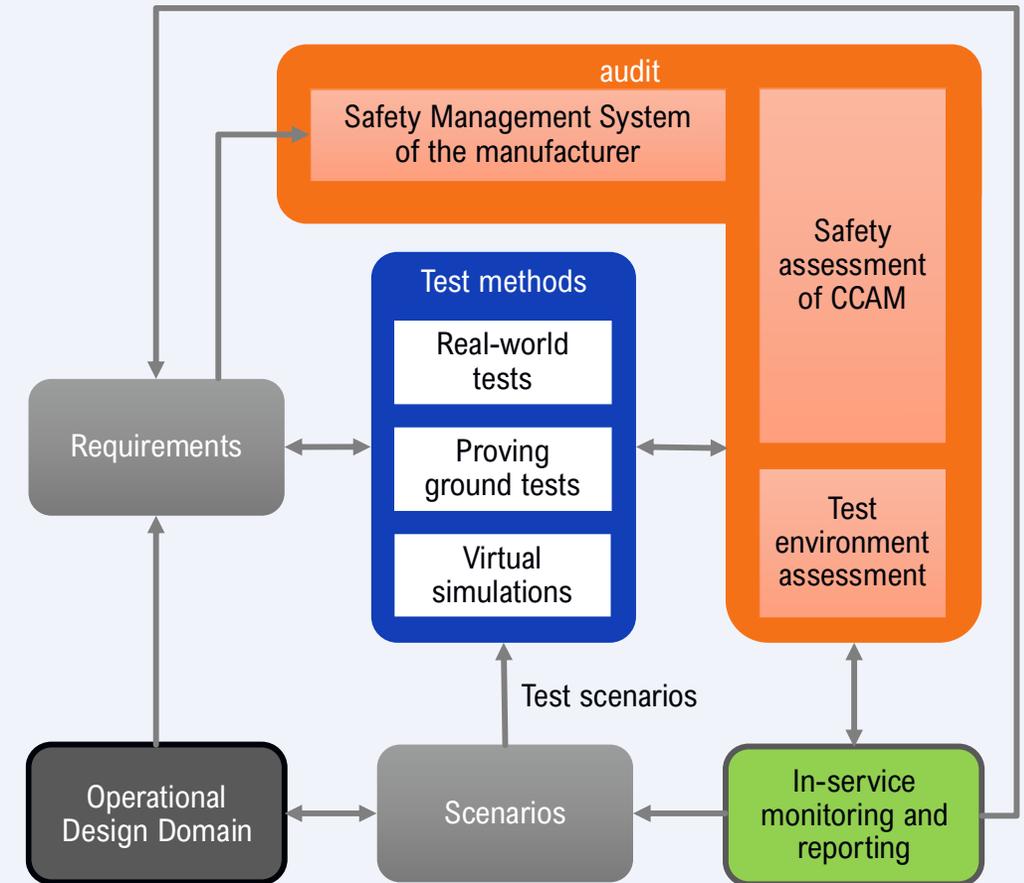
* UNECE WP29 GRVA, "New Assessment/Test Method for Automated Driving (NATM)-Master Document," UNECE, Geneva, Switzerland, 2021.
* R. Donà, B. Ciuffo, A. Tsakalidis, L. Di Cesare, C. Sollima, M. Sangiogi and M. C. Galassi, "Recent Advancements in Automated Vehicle Certification: How the Experience from the Nuclear Sector Contributed to Making Them a Reality," Energies, vol. 15, 2022.

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Selected EU R&I projects on Safety Assessment

ASSESSMENT METHOD

CERTAIN

SUNRISE

HEADSTART

SYNERGIES

TOOLS & ENABLERS

SECREDAS

V4SAFETY

Human driver behaviour

ENABLE-S3

SAFE-UP

REAL-WORLD PILOTS

HI-DRIVE

LSD

L3PILOT

ENSEMBLE

2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029

HORIZON 2020   **HORIZON EUROPE**
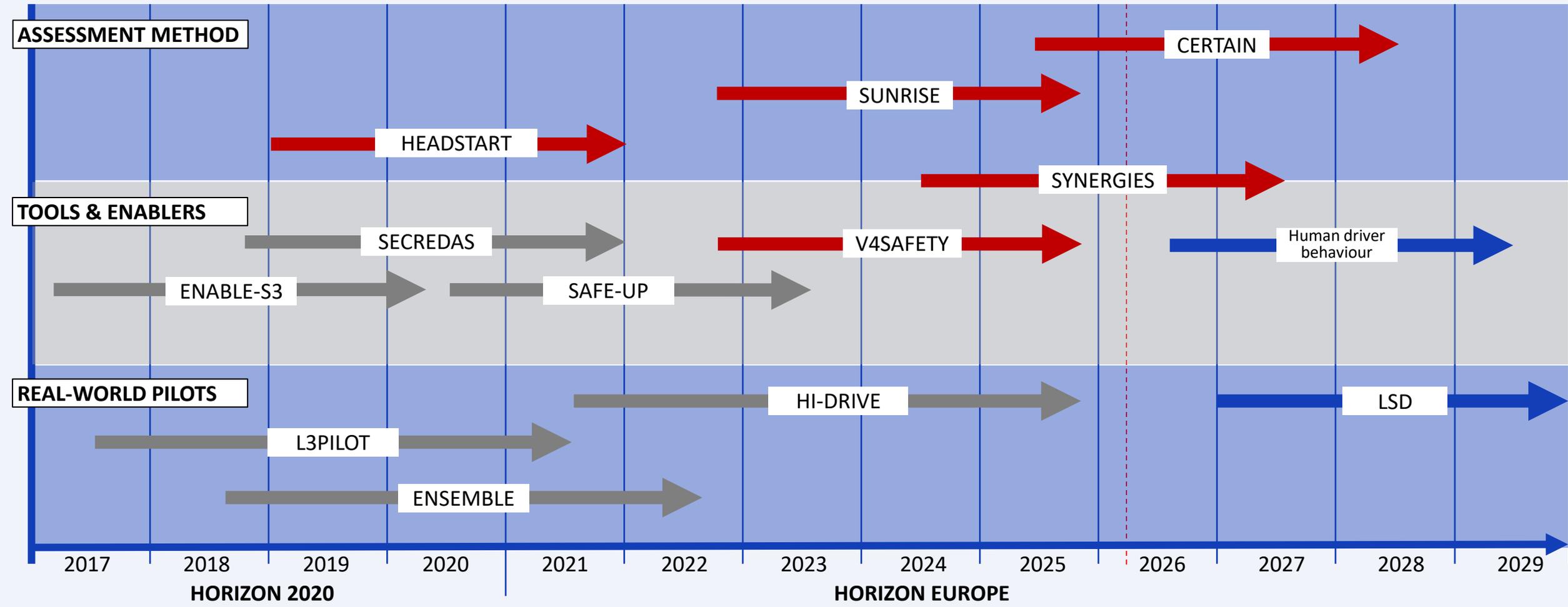
Established international collaboration with SAKURA 🇯🇵

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Harmonization through collaboration

- Long-term collaboration between SAKURA and EU projects

- 2021: white paper on harmonization of safety assessment methods (SAKURA – SIP-adus – HEADSTART)

- Formalize agreed terms and definitions for scenario-based assessment:

    - **ISO** ISO 3450X (scenarios, test scenarios, ODD, …)

    - ASAM OpenX (interoperability, formats, templates)

- Collaboration has resulted in a solid basis for scenario-based safety assessment. Application thereof is key for the required acceleration of AD development and the safe and responsible deployment.

2021

TOWARDS THE HARMONIZATION OF SAFETY ASSESSMENT METHODS OF AUTOMATED DRIVING

SAKURA – SIP-adus - HEADSTART

Introduction

Mission and objectives

This white paper aims to summarise and harmonize the activities performed in the context of automated driving safety assessment methods through different initiatives that are currently led by the Japanese government and European Commission research programs.

The white paper objectives are to:

1) Compile and present the different initiatives for which each region is working on the topic and show under which general R&D programs they are operating
2) Identify which topics and, or challenges related to safety assessment have been the object of research by each of the referenced initiatives to assess the areas where they are making specific progress.
3) Harmonize, whenever possible, the results achieved so far, and identify potential activities for further harmonization that could be encouraged and fostered within the regions and or in future R&D initiatives.

Reasoning behind the white paper

Automated driving safety assessment methods are a complex, multi-faceted challenge that involves a number of concurrent areas of research and technical expertise. Notably, they also rely on several technologies with different levels of maturity. In the case of these safety assessment methods being associated with a safety assurance framework, additional factors need to be considered, e.g., regulatory needs.

Consequently, direct comparisons between diverging approaches are difficult to assess, and potential harmonization efforts need to be carefully identified and agreed on.

Within this paper, an initial approach on how to identify the most promising topics for harmonization has been agreed upon between the participants to trigger further actions. This approach will be achieved through a systematic procedure that enables each project to be independently addressed. The scope of this white paper has been limited to a reduced number of relevant projects, but the systematic approach applied could be extended to incorporate other international activities.

This paper also fosters the cooperation at the international level between Japan and Europe of these different initiatives and supports dissemination and communication of (joint) activities.

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Upcoming challenges

- Operationalization of scenario-based safety assessment:
    - Building and evaluating a **safety case** in agreement with the NATM approach
    - Ensuring sufficient scenario coverage of the Operational Design Domain
    - Proper validation & verification of methods, tools, and data
    - Providing references and acceptance criteria for the provided tests
    - Continuous safety assessment beyond deployment (**ISMR**)
    - Dealing with innovations such as **end-2-end AI**

- Specific challenges for the Netherlands:
    - How to ensure a good representation for safe and responsible deployment in NL
    - EU type approval – testing for deployment in various EU-countries

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We face severe challenges and there is no easy solution – also not by using end-2-end AI automation.

Dialogue between authorities and industry needs to be intensified and fostered with practical experiences.

Continued collaboration between the EU and Japan remains important.

Thank you very much for your attention.

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