AI-BASED CCAM: TRUSTWORTHY, EXPLAINABLE, AND ACCOUNTABLE

The Autonomous Main Event 2024

Spotlight Session – Driving the Future: The Rise of Software-Defined Vehicles

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Motivation

Connected and Cooperative Automated Mobility (CCAM) is blooming thanks to **Artificial Intelligence (AI)**

- CCAM solutions have benefited from the applicability of AI-based perception, situational awareness, and decision-making components
- learning highly complex transformations that operate over input sensor data and produces end-commands (steering angle, throttle).

… unveiled the fact

- **Black Boxes** for their critical lack of transparency and interpretability.
- **AI can be unfair** and biased, expose private data, and be extremely sensitive to unexpected inputs

Trustworthy AI is the next mandatory step of technology development

- trustworthy AI requires exploring trade-offs among other equally important properties: **robustness**, **privacy**, **explainability**, **accountability**, and **ethics**

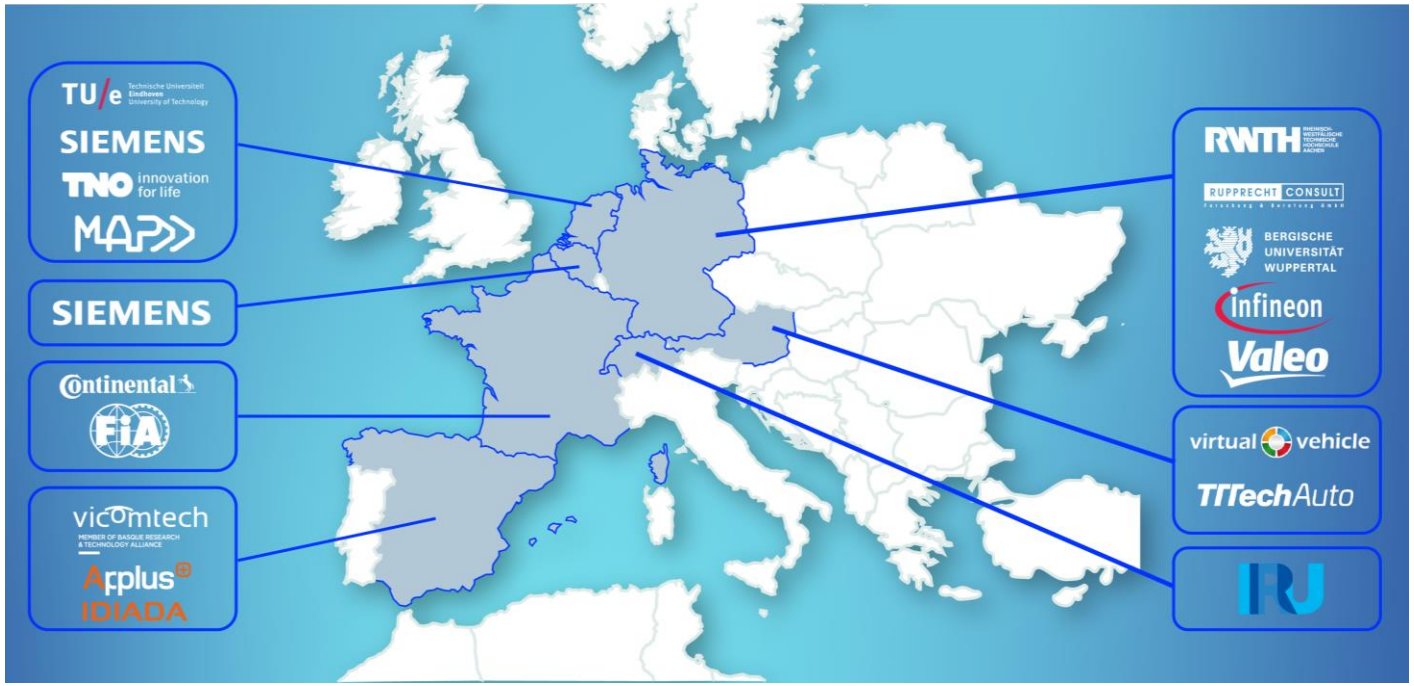
AITHENA PROJECT

Call: Safe, Resilient Transport and Smart Mobility services for passengers and goods

Topic: **HORIZON-CL5 2022 D6-01-05**: Artificial Intelligence (AI): Explainable and trustworthy concepts, techniques and models for CCAM

Type of Action: Research and Innovation Action

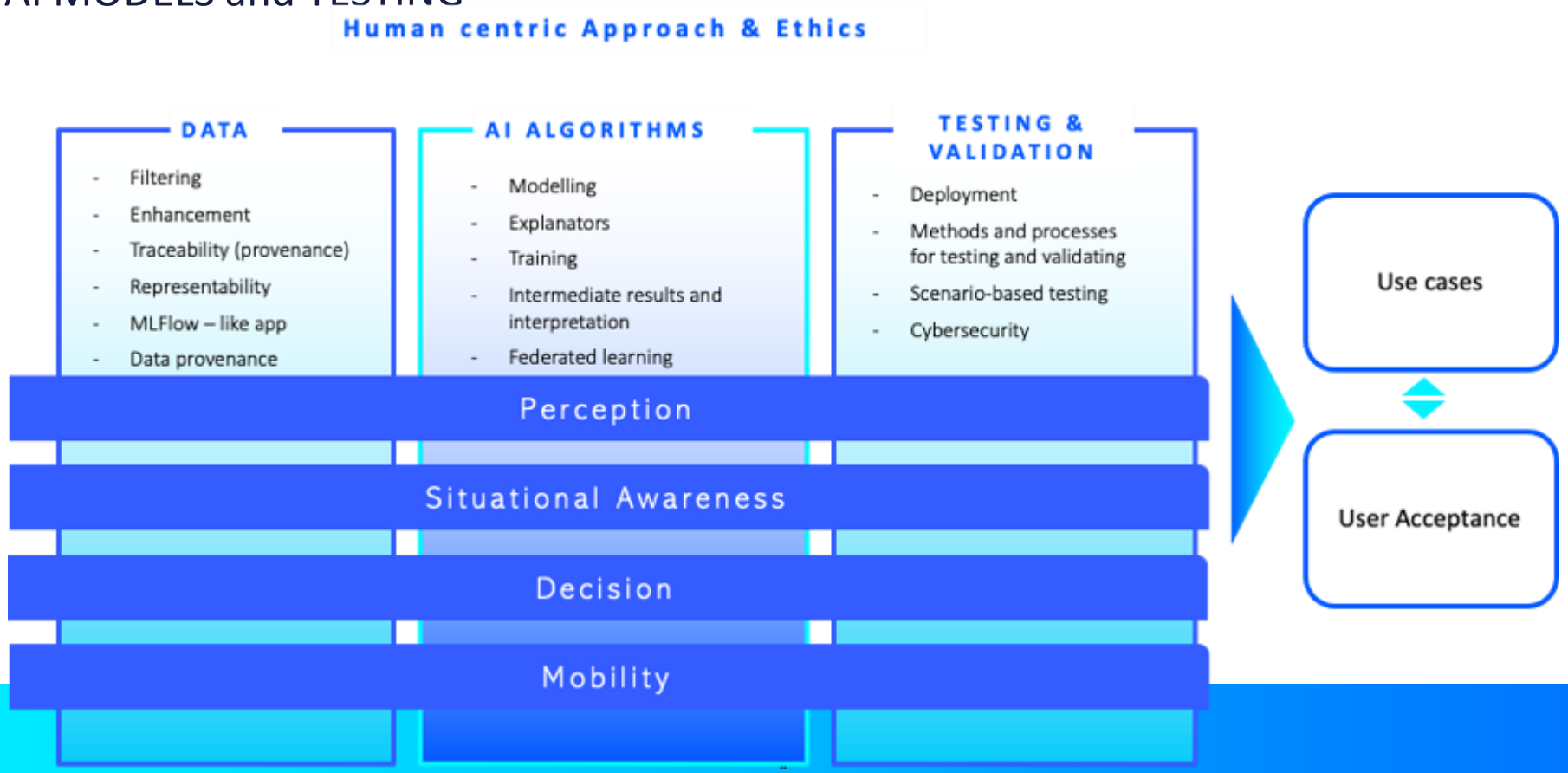
Coordinator: VICOMTECH (Spain)
Consortium: 17 partners
Start: 1 November 2022
Duration: 36 months
Budget: 5.999.549 €



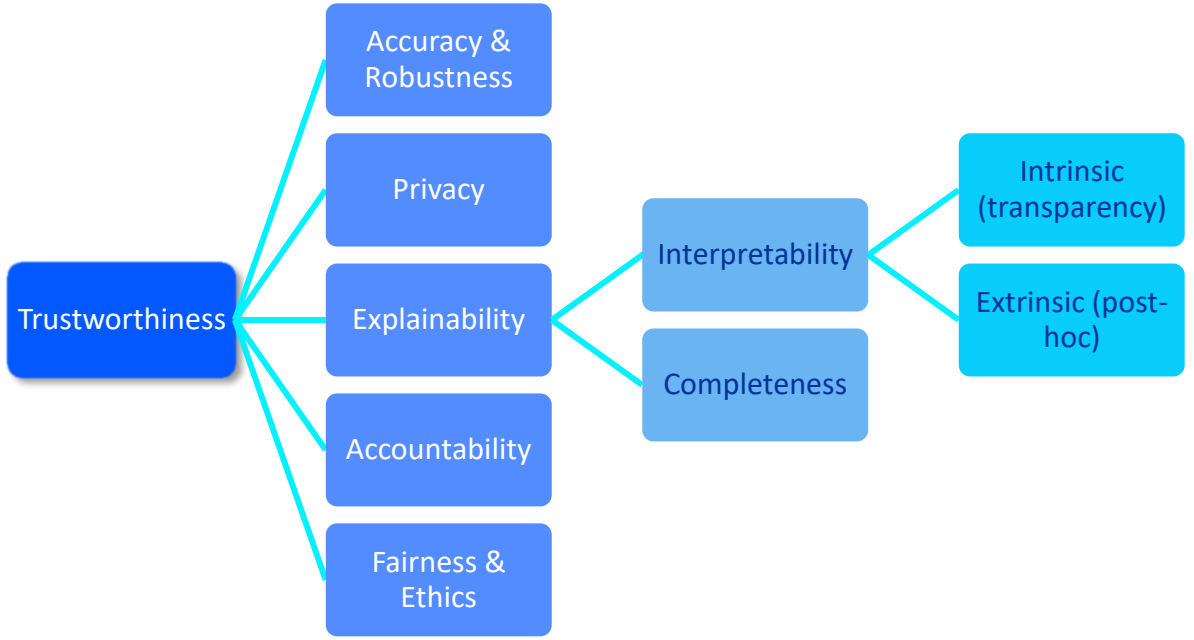
APPROACH

AITHENA will face **methodological** and development challenges for the **creation and integration** of **XAI-based models** and systems into **CCAM applications** (use cases: perception, situational awareness, decision-making and traffic management).

AITHENA will provide a human-centered METHODOLOGY towards the evolution of the three main AI pillars: DATA, AI MODELS and TESTING



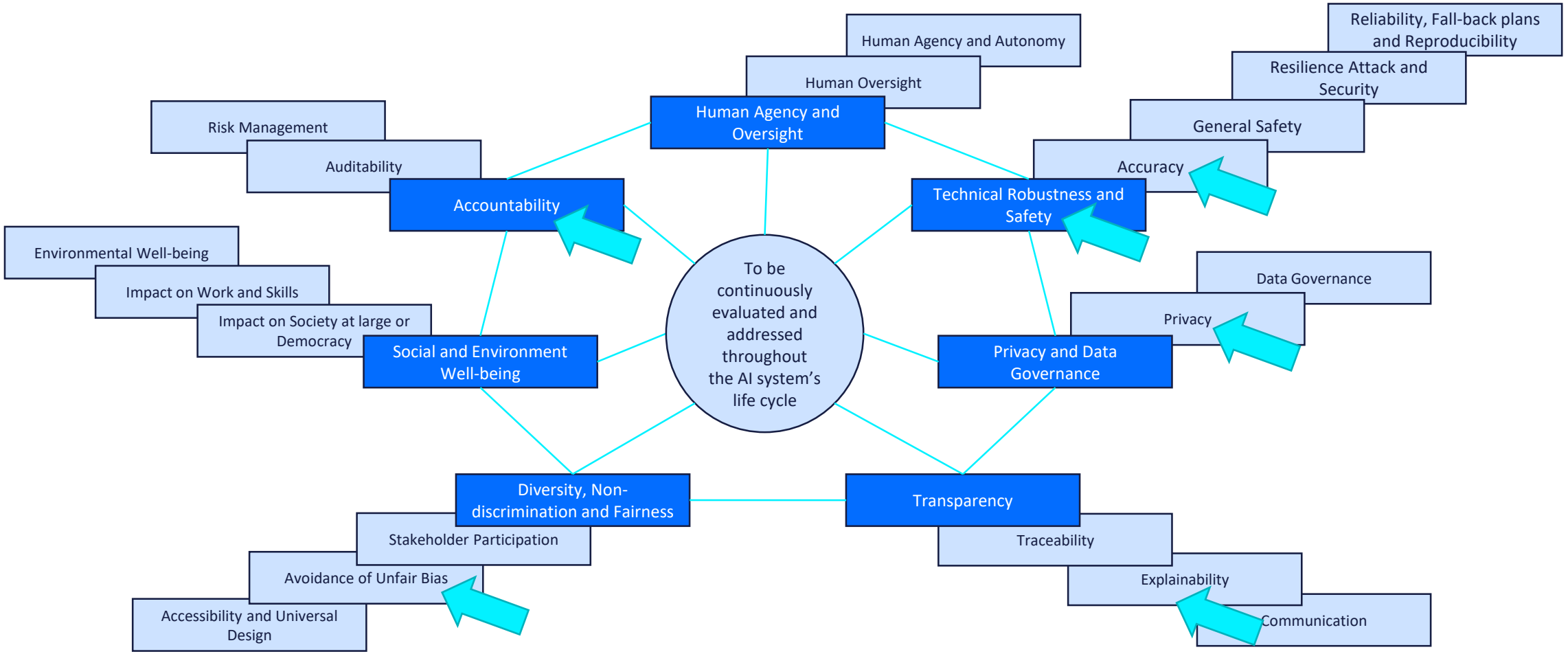
General Requirements – Areas of Activity



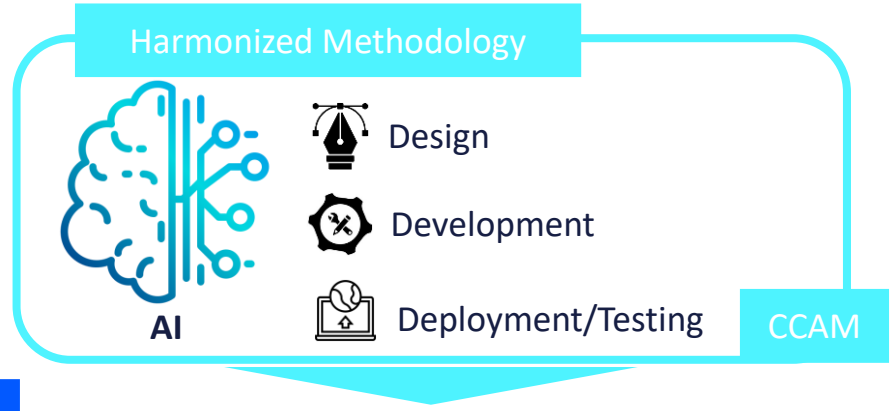
Requirements of Trustworthy AI – Link to the AI Act

AIthena focus topics

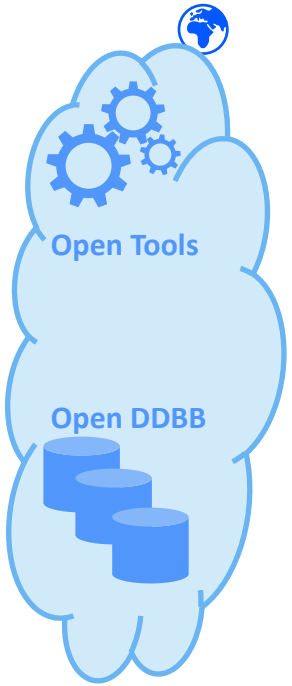
7 requirements tightly interconnected



VALUE PROPOSITION



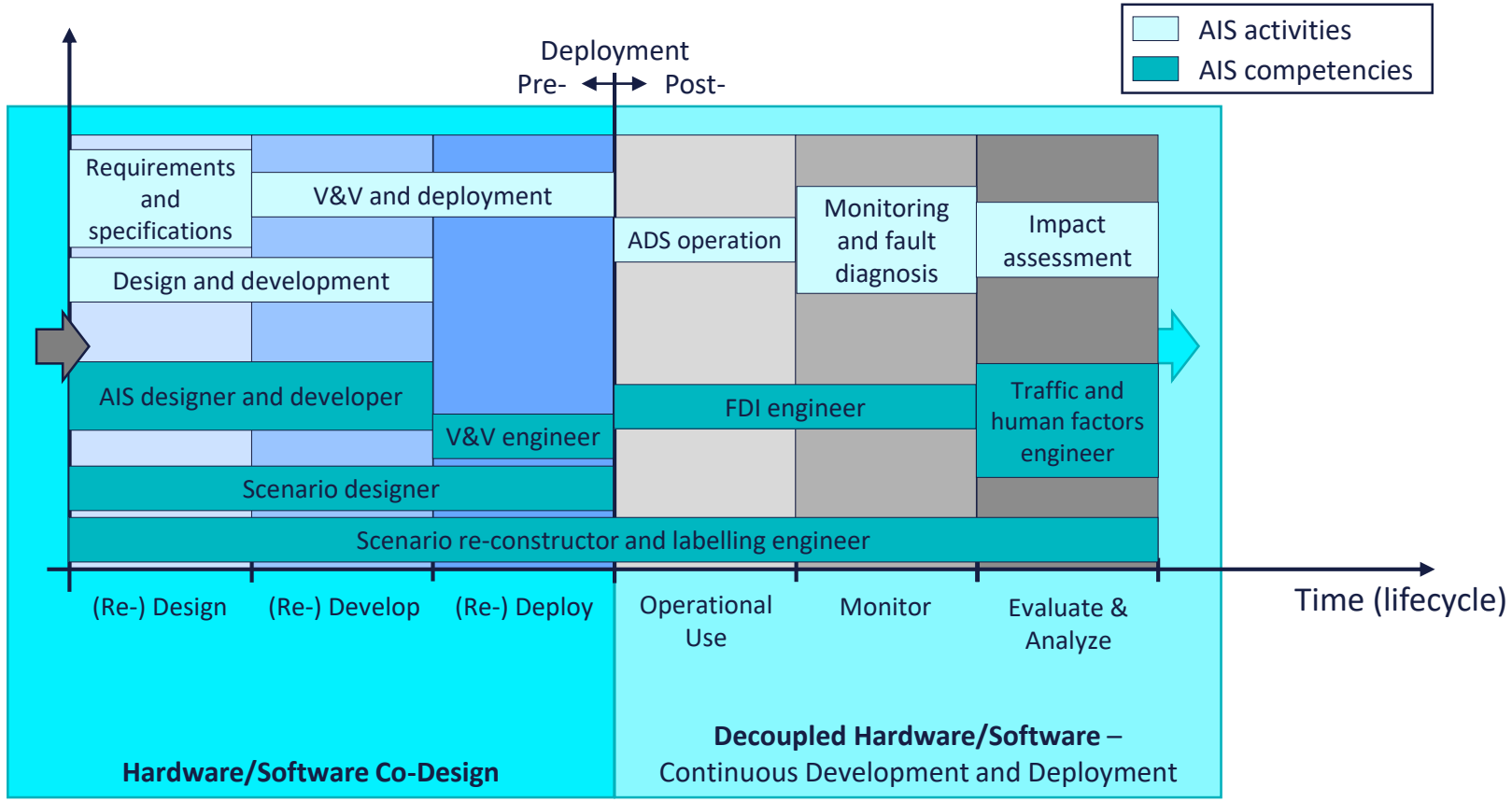
Standarisation (EuroNCAP), Testing & Validation



AI lifecycle acts as a game changer

HW/SW co-design vs. decoupling HW/SW

- The AIS life cycle incorporates the **entire AIS value chain**
- Software-defined-Vehicles (SdV) and AI in particular **changed the way of working completely**
  - New focus element: post-deployment phase
  - Continuous development and deployment (software)
- Pre-deployment phase is driven by **hardware/software co-design** principles while the post-deployment phase is **hardware/software decoupled**



SPECIFIC OBJECTIVES

- **Explainable, privacy-preserving and traceable data management Tools**
- **Development Framework (“DevOps” like) to ensure data and model lifecycle tracking and management**
- **Digital Twin for data generation**

- **Methodology and good practices for AI based CCAM solution development and testing**
- **XAI models – research and development of explainable AI models**
- **Development of human-centric AI solutions for future CCAM applications strengthening user acceptance, explainability and trustworthiness**

- **Testing and validation procedures – methodology for extending HEADSTART methodology to include AI based functions and systems**
- **Trusted AI Key Performance Indicators for CCAM components**

CCAM

- Trustworthy and Robust Perception systems
- Human Understandable Situation Awareness System including driver state
- Explainable Driving Decision methods
- AI-based traffic analysis module

References

[1] G. Stettinger, P. Weissensteiner and S. Khastgir, "Trustworthiness Assurance Assessment for High-Risk AI-Based Systems," in IEEE Access, vol. 12, pp. 22718-22745, 2024, doi: 10.1109/ACCESS.2024.3364387.

THANK YOU!

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