AI-assisted Methods and Tools for SDV Engineering Automation

Chips JU Call 2025 - Focus Topics on Automotive ECS Information Session

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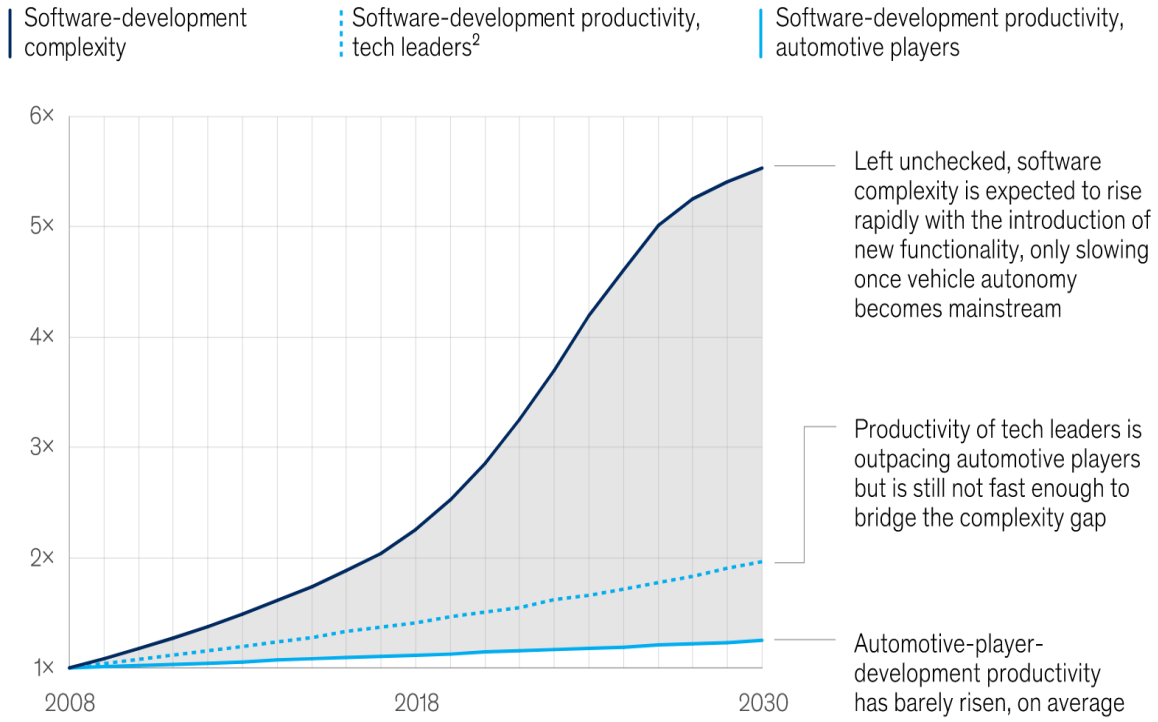
EUROPEAN PARTNERSHIP

The hurdles of SDV engineering productivity

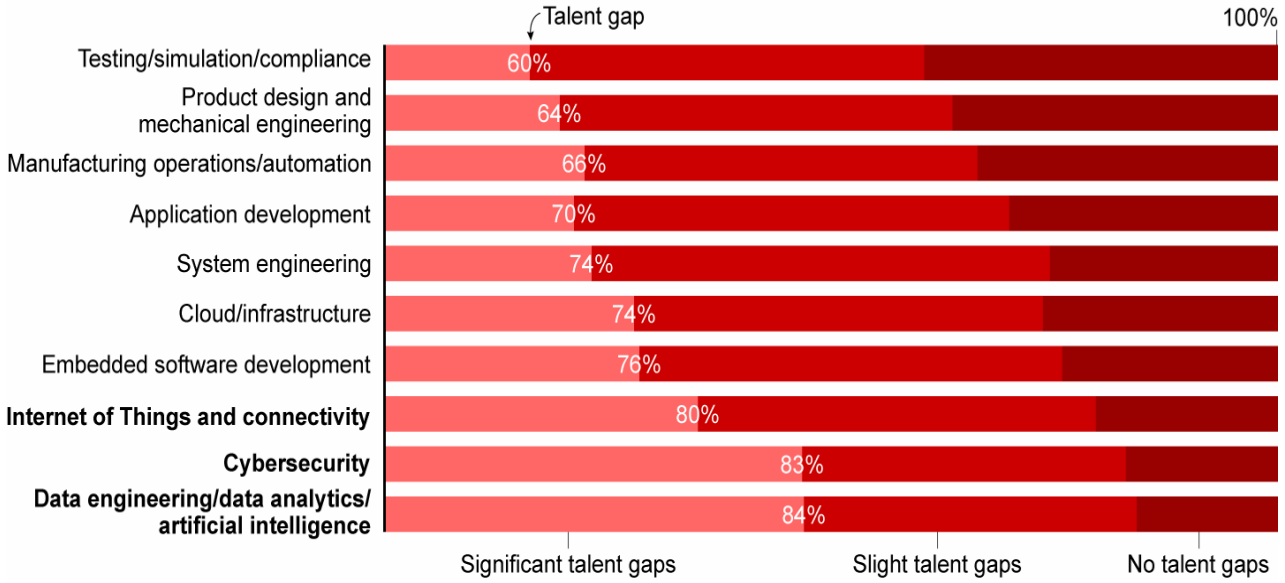
➢ **Unsustainable gap** between software development **complexity** and **productivity.**

Relative growth over time, for automotive features,[1] indexed, 1 = 2008



[1]Analysis of >200 software-development projects from OEMs and from tier-1 and tier-2 suppliers.
[2]Top-performing quartile of technology companies.
Source: Numetrics by McKinsey

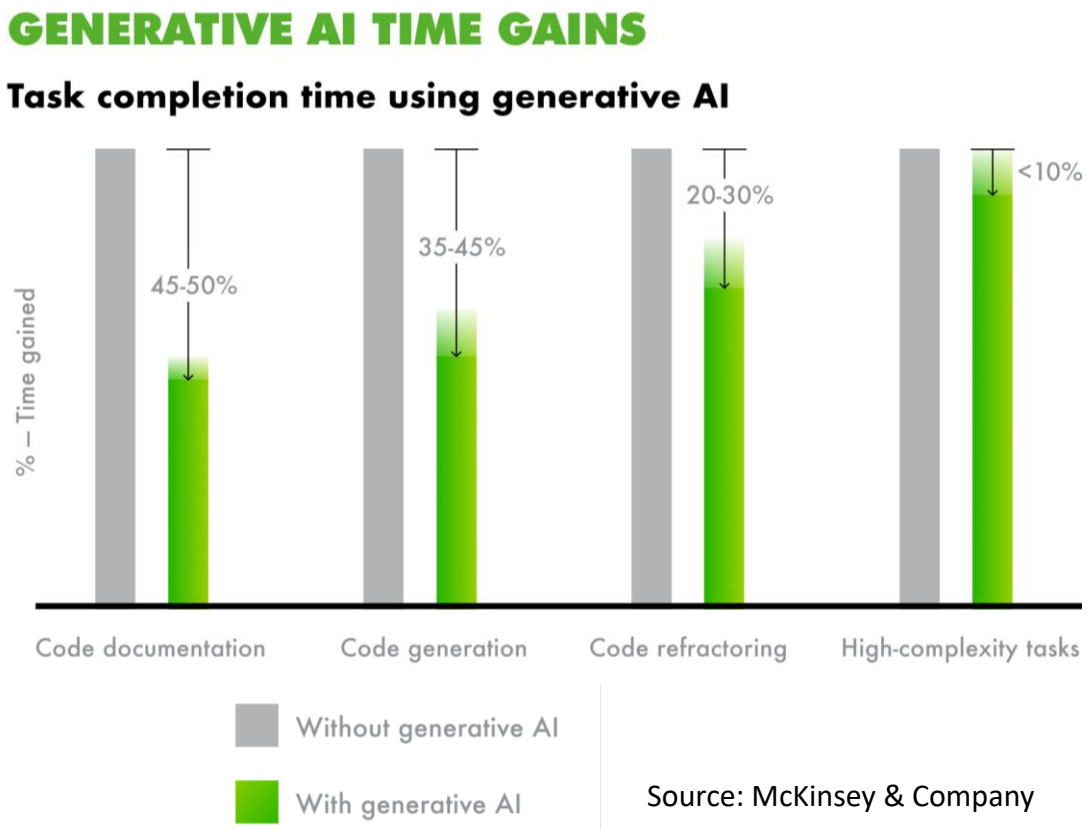
➢ **Talent shortage: 73%** of **Engineering and R&D**-focused companies report talent gaps.



Notes: Decision makers were asked, "Do you expect talent gaps in the below capabilities over the next three years? (single choice by capability)"; results filtered for aerospace and defense; the formula for calculating talent gap percentage is first adding number of slight talent gaps together with the number of significant talent gaps and then dividing the sum by the total number of responses
Source: Bain Engineering and R&D survey 2022 (n=505)

The role of AI and its challenges in SW development

- **(Generative) AI** can **substantially improve** software development efficiency.



Source: McKinsey & Company

- However, there are still a number of **challenges to scale** the ability to handle development complexity with AI:
  - There is a **lack of symbiosis** & seamless collaboration between human and AI-assisted engineering tasks (including cultural changes), which is a critical barrier for adoption by tool users.
  - Tools & data **trustworthiness** (safety, security, privacy, etc.) and **regulatory/standards compliance** is a roadblock for (automotive) organizations.
  - Most of current industry-level AI-assisted tools are **problem/domain-specific or proprietary**, which limits ROI, particularly for SMEs.

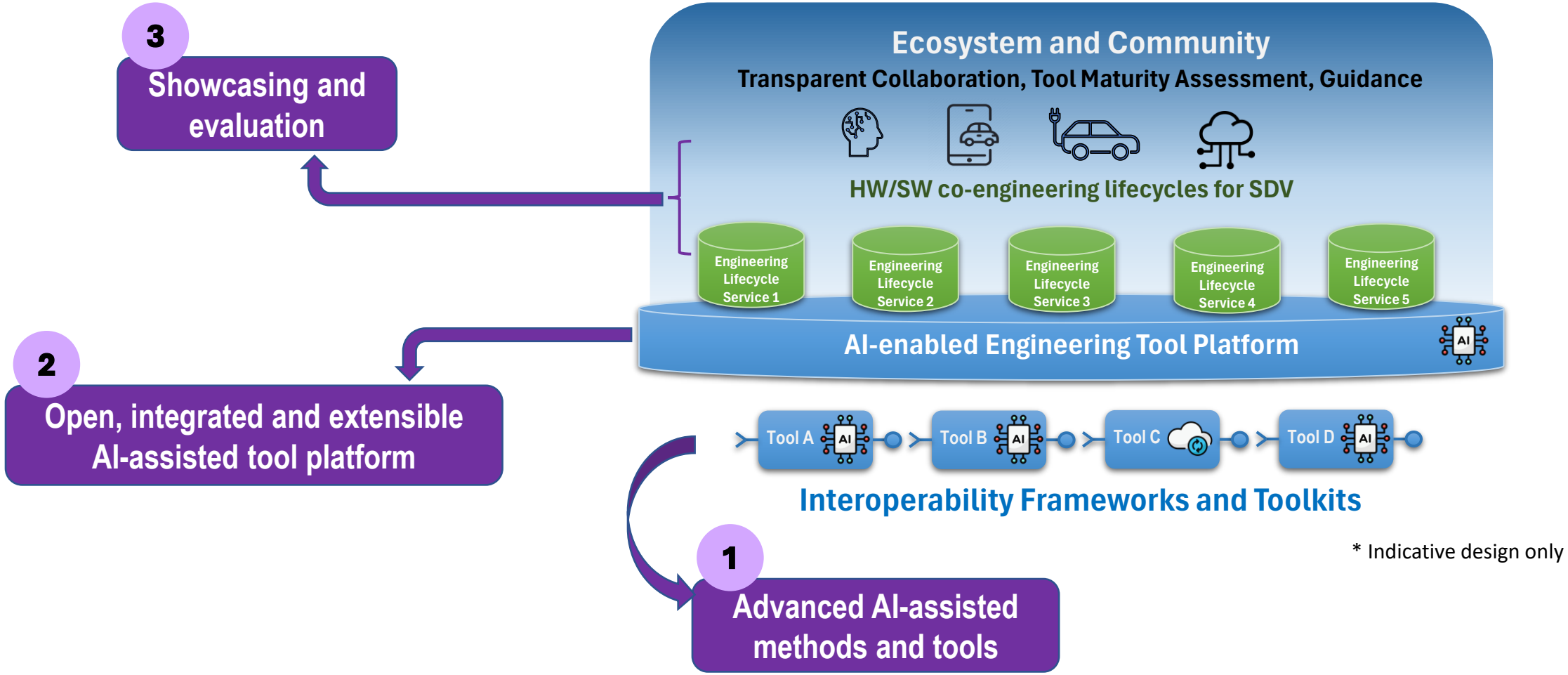
Focus Topic in a Nutshell

Vision: **massively accelerate SW development engineering efficiency**, by building upon a **cohesive collaboration** between **humans** (with their ability to innovate and create intuitive solutions) and **AI tools** (with its ability to propose solutions exploring huge search spaces and recognizing statistical patterns from large data).

- **Objective:** Methods and tools aimed at improving productivity/efficiency of SDV engineering processes (including design, V&V, and certification), through AI-enabled automation (with special attention to generative AI).
- **Scope:** Methods and tools for the engineering automation of the full technology stack, based on open platforms, focused on SDV, which involve complex distributed systems from multiple vendors, and are characterized by stringent safety and security standards and legislation.
  - Best practices and small proof-of-concept studies for other sectors, e.g. medical/pharmaceutical and/or digital industry.
- **Type/Size of Action:** Innovation Action (IA) - ↑TRL6-7 – Indicative EU funding of 20 M€

* This focus topic is part of the Software-defined Vehicle Focus Area of the European Digital Vehicle Initiative. Selected actions will be implemented as '**linked actions**', i.e. they are linked with other actions selected under 'SDV Vehicle of the Future' topics in past calls, this call and future calls.

Expected Outcomes



* Indicative design only

Scope (1/3): Advanced AI-assisted methods and tools

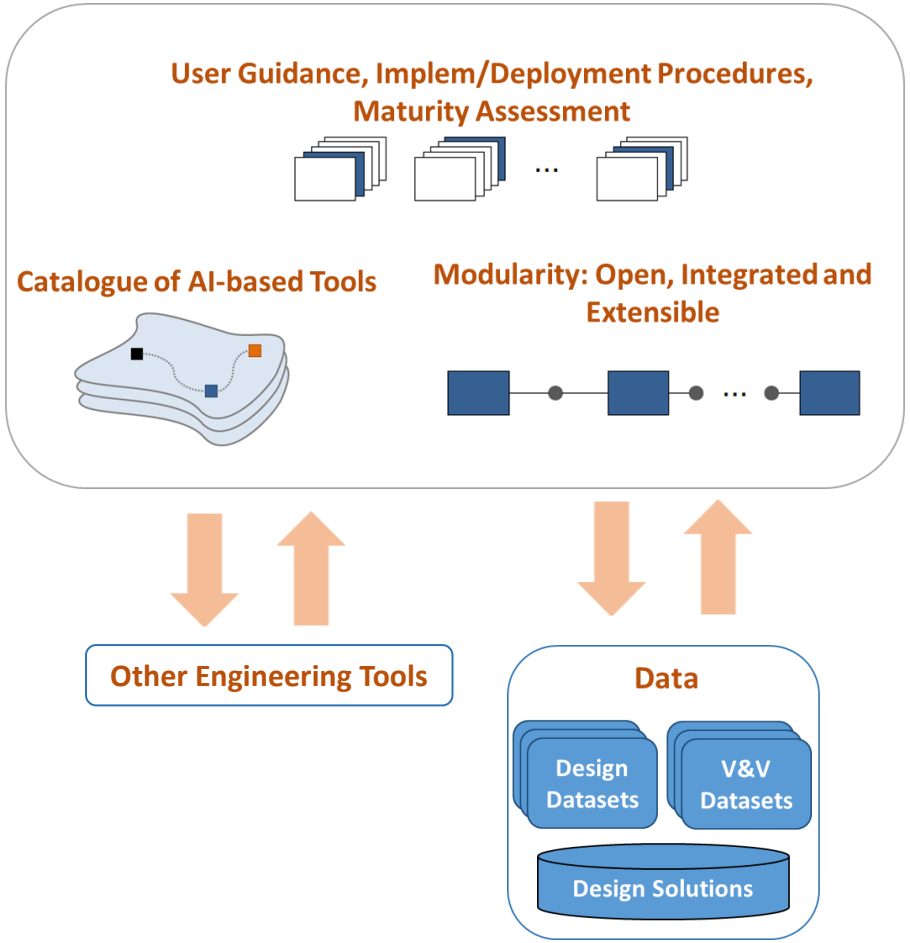
Automation **tools for SDV engineering tasks**, involving **multiple domains** (e.g., modelling, control, data management, communication, mechatronics, etc.) and **stakeholders**, with the burden of daunting **legacy integration, refactoring**, and the compliance with specific **standards and regulations**. Specific expected contributions:

- Adoption of **Gen AI**: software models and architectures, code snippets generation, test and debugging, documentation and providing support for software lifecycle.
- AI-supported **design and development**:
  - Optimisation of non-functional properties, optimisation of HW/SW modularity, automated development, customisation & maintenance of firmware, drivers, APIs, libraries, microservices, (real or near real-time) data management, e.g., data cleaning, classification, labelling,…
- AI-supported **V&V (test, simulation,…) and certification**:
  - Search of the validation/verification spaces for multi-criteria optimization, generation of test datasets along continuous testing, automated faults injection, automation of regression test, electromagnetic compatibility test, functional test, from model-based engineering to certifiable code,…

Scope (2/3): Open, integrated and extensible platform

AI-based tools and toolchains, following a **well-defined engineering process**, including the integration with legacy tools. The platform shall provide flexible usage in small and large **multi-stakeholder** engineering teams.

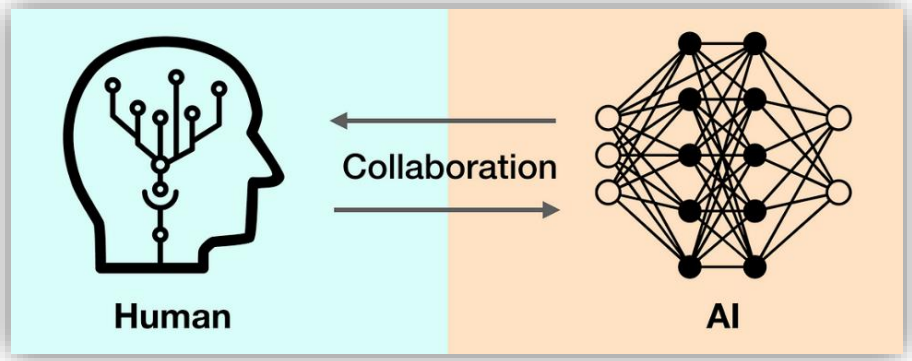
- Open architecture and integrated platform technology supporting **service-oriented** business models for AI-powered tools.
- Integrated and sustainable **platform ecosystem** with guidance for users & developers, continuous tool maturity monitoring.
- Particular attention is expected on the identification, inception and proposal of de facto or de jure **standards** covering **procedures, models, taxonomies and API**s for AI-based engineering processes.



Scope (3/3): Showcasing and evaluation

AI-based engineering solutions should be largely **domain independent** but shall be adopted and **showcased primarily** in the software layers of the European Digital Vehicle technology stack (**SDV**). Showcasing shall **focus** on:

- Demonstrate **productivity improvements** in resource optimization, energy efficiency, complexity reduction, quality, interoperability.
- But also in **usability**, incl. non-technical aspects such as new creation fashions, higher comfort, stress and effort reduction, etc.
- Collaborative **exploration, discovery, adaptivity, visualization** and continuous **co-learning** of high-dimensional design spaces.
- **Human-centric seamless interaction with/between designers** and other stakeholders
- Identify best practices for **other vertical domains** (e.g. medical/pharmaceutical and/or digital industry).



Call Conditions

- Two-stage **IA** topic (PO and FPP stages)
- **20M€** indicative EU budget
- Size limit = 40 participants
- Involve a **significant and representative number of actors** across the **European automotive value chain**.
- **Ensure strong participation of SME's and start-ups** (recommended share of participants = 1/3)
- Allocate **tasks to cohesion activities** with the project(s) selected under the other focus topics on automotive ECS
- Participation is limited to legal entities established in **EU Member States, Norway, Iceland, Associated Countries, OECD** and **Mercosur** countries

Chapter	PO Stage	FPP Stage
Excellence	60 pages	60 pages
Impact	60 pages	100 pages
Implementation	60 pages	100 pages

Type of beneficiary	Maximum EU Contribution as % of the Eligible Cost according to HE
For profit organization but not an SME (LE)	25%
SME (for profit SME)	35%
University/Other (not for profit)	35%

Thank you!