SID 2025
Sibiu Innovation Days
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EMERGING DISRUPTIVE TECHNOLOGIES:
Balancing Innovation, Risks, and Societal Impact

Navigating the Future of AI Integration: Competency Development, Ethical Considerations, and Workforce Adaptability in „Organizations 5.0”

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PANEL 3

Artificial Intelligence: fairness, ethics and human-AI collaboration

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Agenda

1. Introduction
   - The challenges of extremely fast advancement of AI technologies in Education and Manufacturing Industry. Three research objectives
   - Manufacturing's AI Skilled Labor Gap
   - Bibliometric study
   - The role of Collaborative Networks in fostering the AI literacy within the workforce and up-skilling employees and students in generative AI technologies
2. Case study – AI adoption and mindset within the Industrial sector and Education
   - Methodology, target group & data collection
3. Experimental results and data interpretation
   - Correlation between Education level or Work experience vs. AI threat
4. Conclusions & Further work

Context

- Organizations 5.0: human-centric, sustainable, resilient and digital
- **AI** become a **central driver of transformation** for 5.0 Organizations
- **Emergence of Generative AI creates the AI Skills Gap Crisis**

Challenges to be considered

- **Rapid AI Growth** (explosion of LLMs and VLMs since November 2022)
- **Industry Lag** (skills gap between AI advancement and workforce integration)
- **Resistance to emerging technologies** and lack of motivation of employees
- **Automotive Impact** (manufacturing sector needs intelligent, data-driven processes)

Benefits of AI adoption

- Higher productivity
- Intelligent automation
- Support for complex decision-making

Challenges

- What is the **level of knowledge about generative AI** among **students, academic staff**, and even **employees** from industrial companies?
- What **challenges does AI introduce in the workplace** or in the **disciplines taught in universities**?
- What should **universities and vocational training institutions** do to **prepare students for an AI-dominated job market**?
- What are the **ethical issues** regarding cheating or who owns the **intellectual property** of material produced by generative AI?
- **How is the future of software developers perceived by automotive companies**? If AI takes more of the coding tasks, what will be the skills that will make a difference in the job market?
- What is **the impact of LLMs and VLMs used by generative AI on energy consumption**?

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Understanding the knowledge gap among professionals regarding generative AI tools

Knowledge Defficiency in Workforce

A prevalent lack of understanding of generative AI limits implementation accross various sectors.

Desire for Learning

Despite knowledge gaps, professionals express a strong eagerness to aquire generative AI skills.

Academic vs. Industrial Awareness

Academic staff generally, show a higher awareness compared to industrial employees regarding AI technologies.

Concerns regarding using generative AI tools

Ethical Implications of AI

Concerns about data ownership and intellectual property arise with the adoption of generative AI.

Job security issues

Generative AI's capabilities raises significant questions regarding future job security for workers.

Cybersecurity concerns

Generative AI introduces varying cybersecurity challenges that 5.0 organizations must address proactively.

Human-Centric Design

The integration of AI tools requires a focus on human-centric approaches to ensures ethical consideration.

Research Questions

RQ1: What are **the most frequently explored directions / topics related to generative AI** and its applications across multiple domains?

RQ2: Considering AI's rapid expansion, **what upskilling requirements are necessary in the automotive industry** to improve productivity, and **how can collaborative networks help**?

RQ3: How is the future of software developers perceived by automotive companies?

Bibliometric Study (RQ1)

Scopus

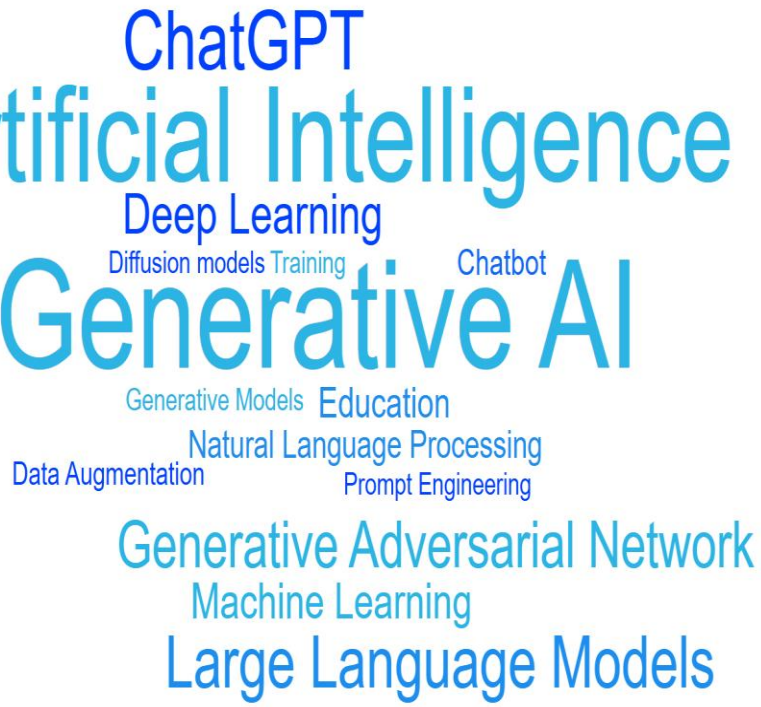
pandas

matplotlib

NetworkX
Network Analysis in Pythor

Year	Publications per Year	
	SCOPUS	WoS
2022	434	366
2023	1722	2631
2024	6279	6110
2025(April)	1287	1199

The number of articles in the domain of Generative AI (9722+ in SCOPUS)



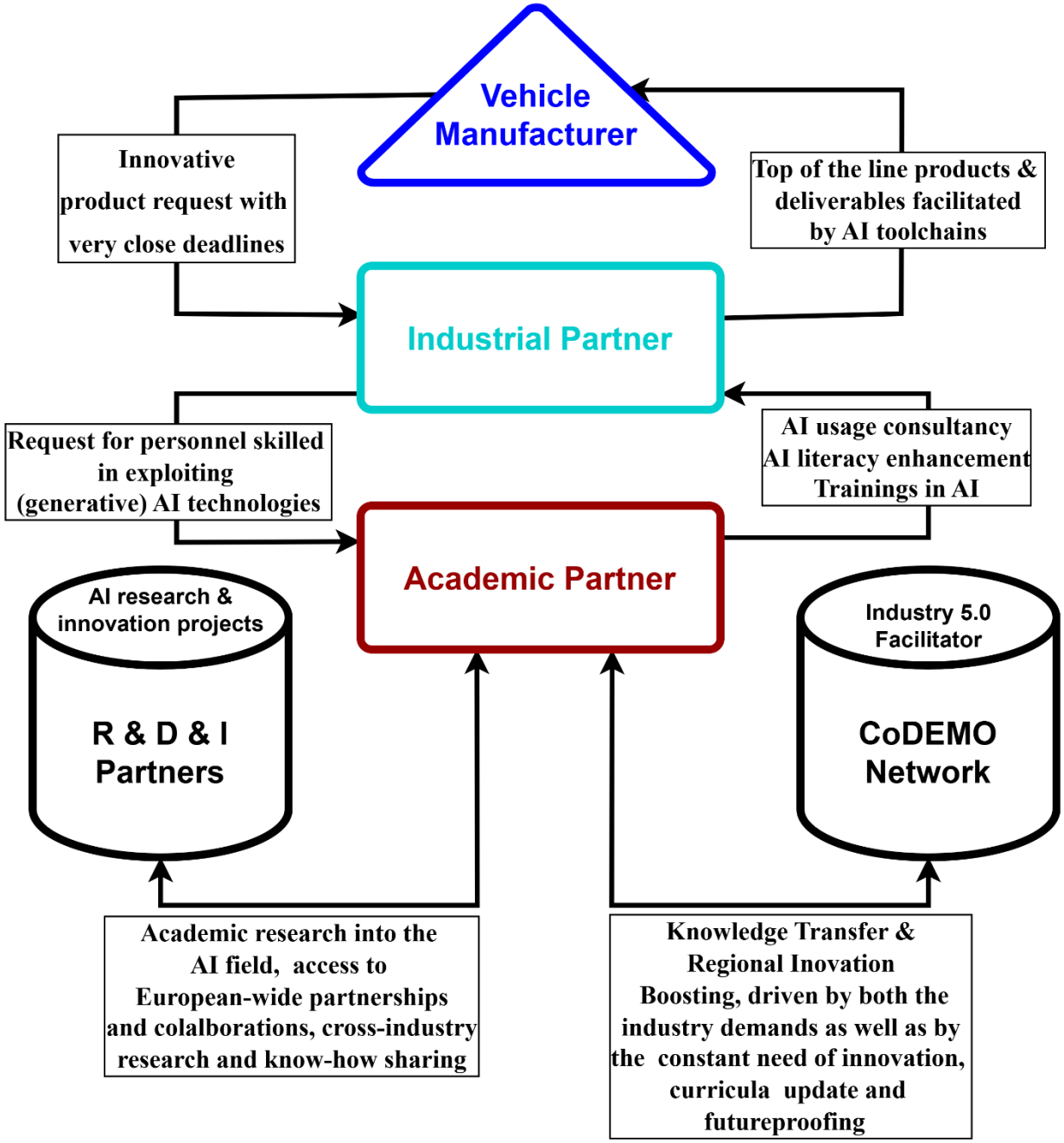
Top 15 keywords in SCOPUS and WoS scientific papers focused on Generative AI

Collaborative Ecosystem solution for AI integration in the upskilling process of the workforce

1. **Collaborative Networks for workforce development** – engaging industries and educational bodies to enhance AI training through partnerships and knowledge sharing
2. **Innovative AI Integration strategies** – integrate state of the art AI tools in training programs that cater to industry needs and demands
3. **AI literacy enhancement initiatives** – projects aimed at boosting AI competency among the workforce to ensure they meet current and future industry standards
4. **Stakeholders engagement in AI training** – involving various stakeholders from education sector to facilitate comprehensive AI training and upskilling

Conceptual CN for enhancing AI literacy of the workforce

A possible solution, for upskilling personnel, could be the deployment of a CN between industry employer – academia and various stakeholders, enhanced by the tools and knowledge transfer set by CoDEMO 5.0 Project.



(Gen)AI Applications in Manufacturing

(RQ2) *What upskilling requirements are necessary in the automotive industry to improve productivity, and how can collaborative networks help?*

Coding & Documentation

LLMs assist in standardizing code documentation and debugging for IoT scenarios

Product Design

Generate virtual prototypes and optimize designs with performance constraints

Surveillance & Security

Predictive maintenance, traffic analysis, and autonomous vehicle obstacle detection in shop floors

Log Parsing

Neural networks generalize beyond training data for improved cybersecurity

Related work study
AI Tools by Department

High Adoption

- **SW Development** & **SW Test:** GitHub Copilot, Microsoft Copilot, Cursor, Bolt
- **Quality Management:** CloudBees Smart Tests, Testim, Keploy
- **All Departments:** ChatGPT, Claude, Gemini, DeepSeek, Grok, Read.AI notes, AI Whisper

Medium Adoption

- **R&D:** Deep Research, Bubble, Loveable
- **Marketing & Sales:** Gamma, Presentations.ai, AdCreative, Canva Magic Studio, Dall-E 3
- **Project Management:** Asana, ClickUp, Presentations.ai
- **Industrial Engineering:** Asana, Reclaim, Clockwise

Small Adoption

- **Human Resources:** Textio, CVViZ, Canva Magic Studio, Vista Social, FeedHive
- **Communication:** Grammarly, Wordtune

Our Case Study:
AI adoption and mindset within the Industrial sector

(RQ3) "*How is the future of software developers perceived by automotive companies?*"

- To assess the uptake and adoption rate of generative AI tools in the industrial workforce – both for daily work and personal use – the target group is mostly composed of mid to high experienced engineers that activate in the automotive sector

- Methodology, target group & data collection

Survey Methodology

01

Target Group

- 114 participants: 84% industrial sector (MQ), 16% academic personnel (ULBS)
- 52% have 10+ years of experience in their field, while 25% have less than 5 years of experience.
- R&D (50%+), SW/HW developers, Systems Test, Industrialization, HR

02

Data Collection

- EUSurvey portal with 118 questions across 9 categories
- Survey group demographics (age, gender, education)
- Assess the employees experience and perception about generative AI tools and AI integration in internal processes
- Questions have a pre-determined agreement-scale, ranging from 1 – "strongly disagree" to 4 – "strongly agree".

03

Analysis Method

- For **each question an average value based on all responses** was computed (avg_q). In addition, for **each category in the questionnaire, an average value over all questions** from that category was also computed (avg_c).
- **Pearson correlation** coefficient and **regression analysis**

Experiment Results (1)

Average values obtained for most important 8 categories of assessment topics		
General category from questionary	**# questions in category**	**Average value(avg_c)**
Knowledge and Experiences	19	1.64
Capabilities of Generative AI	9	2.60
Ethical governance and concerns	25	2.78
Satisfaction and attitude towards genAI	10	2.59
Study, research and outcomes using genAI	15	2.64
Skills Development using genAI	14	2.46
Labor market and skills mismatch	16	2.75

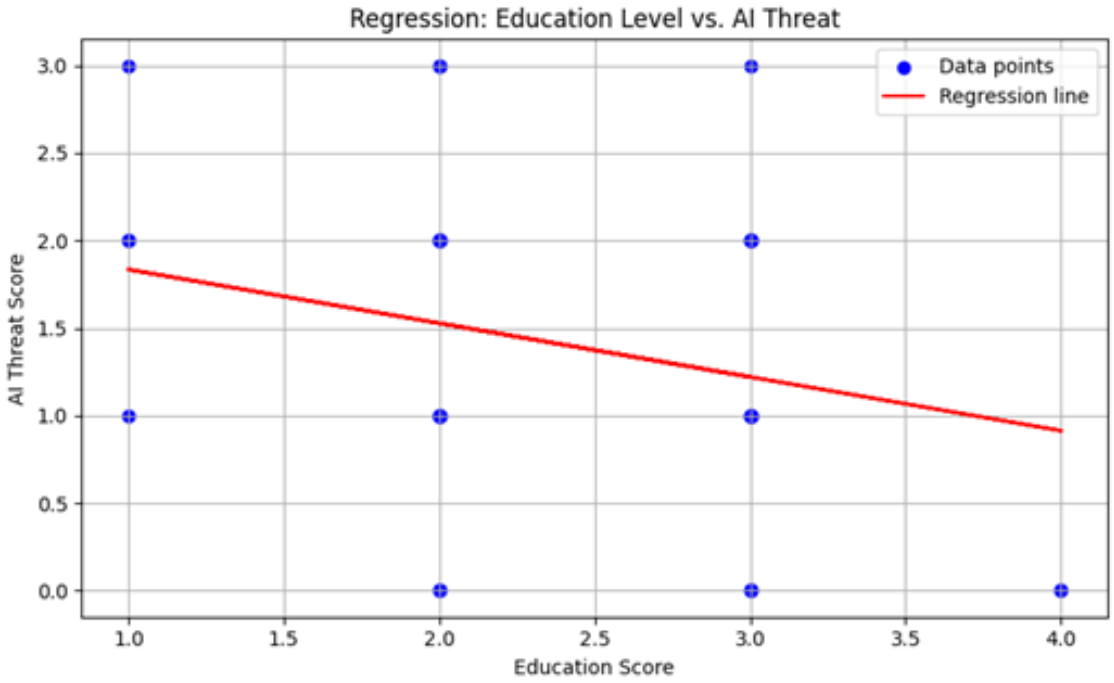
Key Findings

- Participants **worried about AI ethics**
- Strong belief **AI will affect jobs and create skills mismatch**
- **Insufficient AI experience and confidence**

Experiment Results (2)

Correlation between Education level vs. AI threat

- The results reveal a **statistically significant negative relationship between education level and perceived threat from AI technologies**.
- A Pearson correlation coefficient of -0.261 and p = 0.008 indicates a modest but meaningful inverse association: **individuals with higher levels of education are less likely to perceive AI tools as a threat to their professional roles.**
- **Academic staff** generally show a **higher awareness compared to industrial employees** regarding AI technologies



Experiment Results (3)

Correlation between Work Experience vs. AI threat

- Results indicate a **significant negative correlation between work experience and AI threat**, with a Pearson correlation coefficient of -0.248, p = 0.0077.

- This suggests that **individuals, with greater work experience, tend to perceive AI tools as less of a threat to their professional roles**.

- **Experience builds job security and adaptation confidence**

Key Workforce Concerns

- Based on the only **open question** of the survey
- **Most frequently stated** or similarly phrased affirmations from the respondents

Government Control over AI: AI as Tool, Not Replacement

- Should assist professionals rather than eliminate jobs

Limitations and Reliability Issues

- AI produces incorrect results, especially in specialized fields

Need for Regulation

- Government oversight required for ethical implementation

Skills Evolution

- Jobs will change rather than disappear - adaptation is crucial
- It is a strong need for AI literacy

Conclusions & The Path Forward

Develop AI Literacy

- Educational institutions must shift focus to AI-driven technologies
- Gap coverage through the CoDEMO 5.0 initiative, that targets AI training programs
- Evaluating AI literacy progress within organizations (metrics, assesments)

Build Collaborative Networks

- Universities & industry partners working together to facilitate effective upskilling
- CN foster AI literacy by connecting experts, leveraging lifelong learning platforms, essential for Industry 5.0 skills.

Ensure Ethical Implementation

- Responsible and fair use of AI technologies with transparency and best practices

Success depends on working alongside AI, not against it!

Thank you for your time!

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