Issue 13/2026

The Engineering City Journal

Published by the Engineering Association *Yerevan, August 10, 2026*

The purpose of the Journal is to disseminate knowledge, experience, and best practice in engineering & manufacturing.
The articles are written by practicing professionals in the Engineering City (EC) in Yerevan. They cover issues relevant to their projects, operations, and organizations.
The articles address the challenges of the time. As such, the Journal is also a chronicle of the evolution of the EC, its companies, and its individuals.
It is the aim of the Journal to advance the engineering & manufacturing practice, to enrich the engineering & manufacturing community, and to contribute to the worldwide discourse in engineering & manufacturing.

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Organizational Management

. The Sense of Fear of Staying Behind in the Age of AI

by Rama, Engineering Association

Paruyr Sevak wrote decades ago:

«Չուշանա՛լ, եփ չմնա՛լ», –
Այս պիտի լինի ամեն մի
Հայի նշանաբանը՝
Ինչ գործի փեր էլ որ լինի

ՊԱՐՈՒՅՐ ՍԵՎԱԿ

With the appearance of AI, the fear of staying behind is real.

AI is a technology that is sweeping across the world incredibly fast. It became accessible to everyone and everywhere at once. It became applicable to everything. It is becoming more powerful by the minute. And the possibilities that it open is endless.

Such technologies change everything. It changes how we work, how we organize work, what type of products we develop, how we produce them, how we market them, how we sell them, how we support them, and how we improve them.

We may think that we are already using AI, but that is misleading. AI has many higher levels that must be mastered – from running processes, to managing workflows, to fulfilling company objectives, to engaging it as consultant. But now, we mostly use it as a tool to accelerate, or to search. But this is only the lowest level of using AI.

The companies and individuals that master AI on all its levels will move ahead; the rest will stay behind and most likely vanish.

Progress becomes the only means to survive.

This is why this year's EC Meet-up was dedicated to the "New Trends in the Engineering Profession" as not to stay behind.

EC Community News Corner

. EC Meet-up – New Trends in the Engineering Profession

The EC Community concluded its fourth yearly EC Meet-up with the theme – New Trends in the Engineering Profession.

AI continues to force change in our engineering profession. It is forcing change in how we design the products, what products we design, how we manufacture the products, and how we manage the products' lifecycles.

During this Meet-up we wanted to provoke ourselves with what might be ahead of us.

The following presentations were given:

1. Opening Remarks, by Aram Salatian (EA)
2. New Trends in Electronics Engineering, by Suren Eyramjyan (ATG)
3. New Trends in Mechanical Engineering, by Andranik Meliqsetyan (NI)
4. New Trends in Software Engineering, by Hovhannes Hovhannesyan (NI)
5. New Trends in T&M Engineering, by Arsen Arustamyan (NI)
6. New Trends in Manufacturing, by Narbeh Nahapetyan (YEA Engineering)
7. New Trends in Engineering Education, by Grigor Shirinyan (DigiCore)
8. New Trends in Space Engineering, by Hrachoohi Boghosian (CIPR)
9. New Trends in Organizational Design, by Aram Salatian (EA)



Pic. EC Meet-up in the EC Cafeteria.

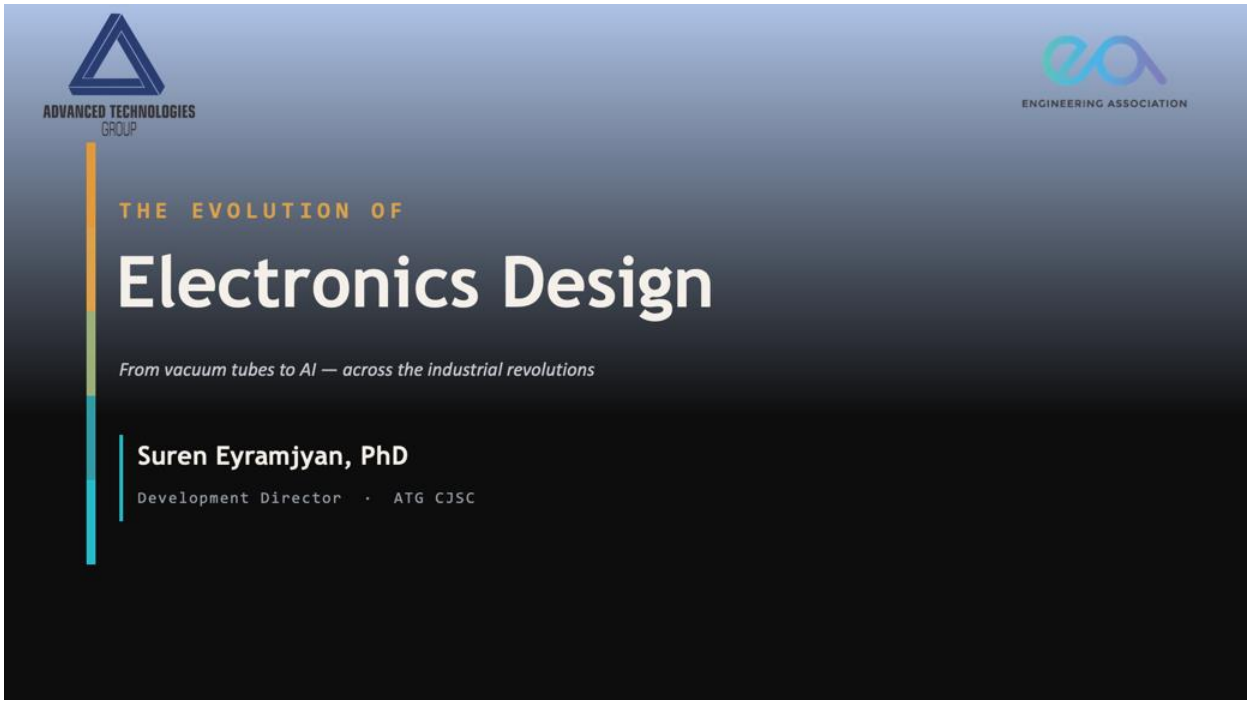
Previous years' themes were:

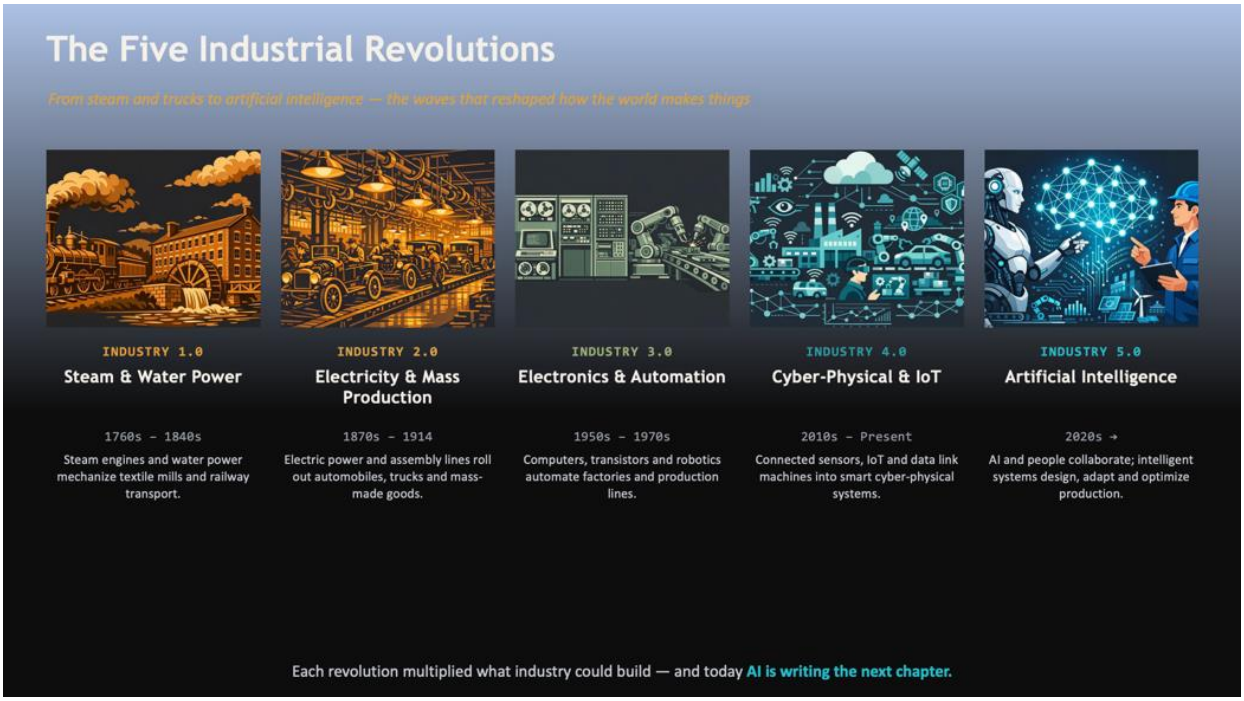
1. *2023: EC Company Presentations – Getting to know each other*
2. *2024: ARC Workshops – Research Topics Roundtable Discussions*
3. *2025: AI in the EC*

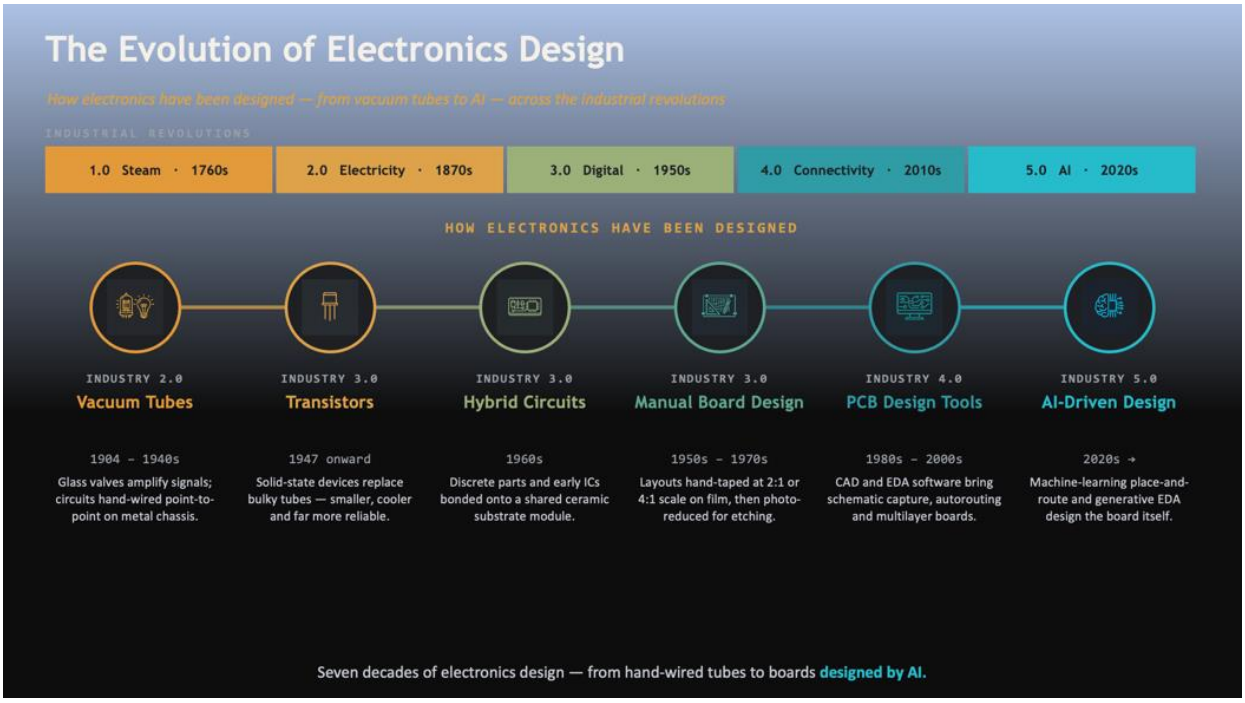
. Presentations at the EC Meet-up

. New Trends in Electronics Engineering

by Suren Eyramjyan, ATG

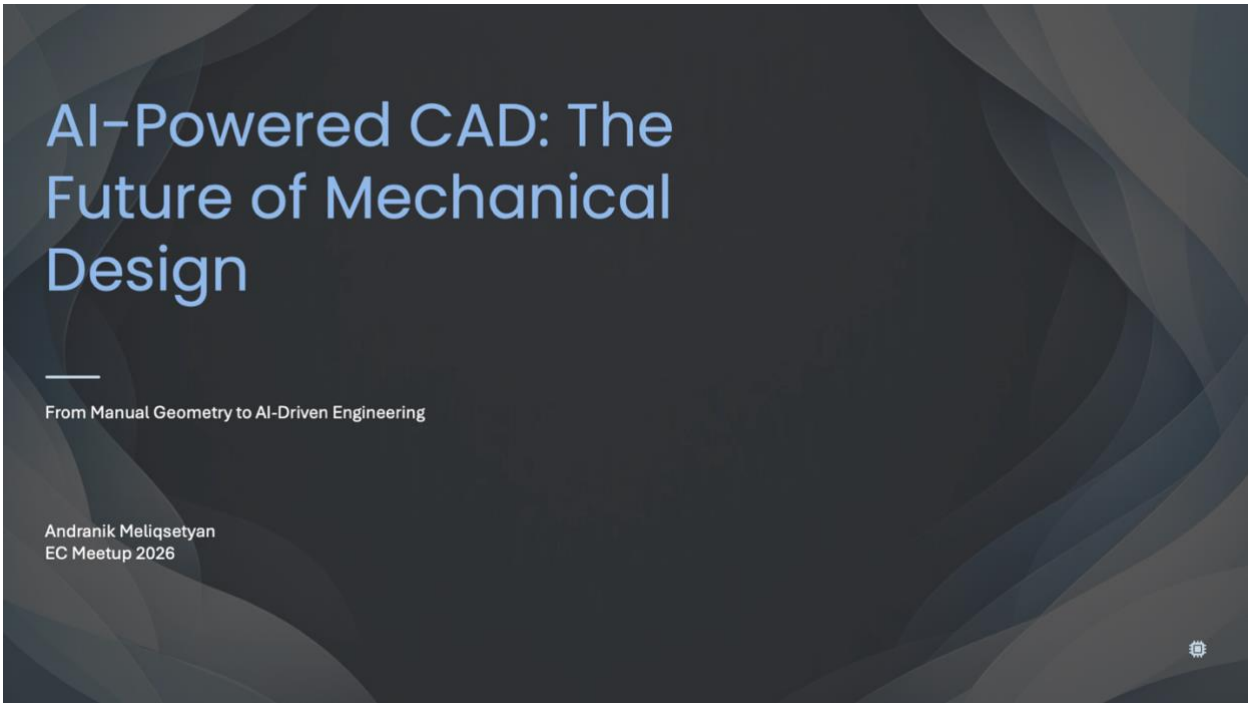






. New Trends in Mechanical Engineering

by Andranik Meliqsetyan, NI



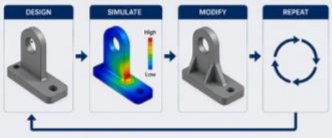
From CAD Modeling to AI-Assisted Engineering

Mechanical design is shifting from manually creating solutions to defining requirements and letting AI explore thousands of possibilities.

Traditional CAD Workflow

Idea › CAD Model › Simulation › Redesign







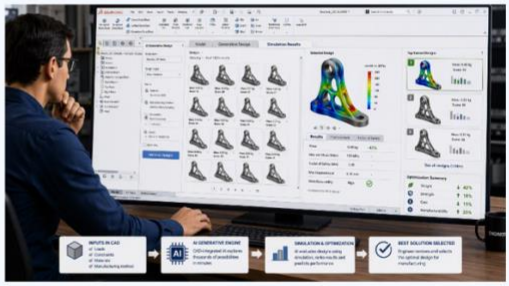


- Engineer creates concepts manually
- Design → Simulate → Modify → Repeat
- Limited number of design alternatives
- Experience-driven optimization

vs

AI-Driven Workflow

Requirements › AI Options › Simulation › Best Design



- Define loads, constraints, materials, manufacturing method
- AI generates hundreds or thousands of design options
- Automatic optimization for weight, strength, cost, and manufacturability
- Engineer evaluates and selects the best solution

What is Generative Design?

Generative design uses AI and cloud computing to explore design spaces beyond human capability.

Inputs

- Functional requirements
- Loads and boundary conditions
- Material selection
- Manufacturing constraints
- Cost targets

Outputs

- Multiple optimized designs
- Weight reduction opportunities
- Improved stiffness-to-mass ratio
- Innovative organic geometries

Example — Bracket Design

Traditional: 1–2 concepts | Generative: hundreds of optimized candidates

Typical weight reduction: 20–50% [1]



Generative Design in SOLIDWORKS and Modern CAD

AI-powered design tools are becoming standard features in commercial CAD platforms.

SOLIDWORKS & 3DEXPERIENCE

- Generative Design
- Topology Optimization
- Design Guidance
- AI-assisted simulation workflows

Benefits for Mechanical Engineers

- Faster concept development
- Lightweight designs with improved performance
- Reduced material costs
- Shorter design cycles

Other Leading Platforms [3]

Autodesk Fusion | Siemens NX | PTC Creo | Altair Inspire

Real Applications

Aerospace Brackets | EV Components | Robotics Structures | Industrial Automation | Medical Implants

Leading Generative Design Platforms

SW	AF	NX	PTC	AL
SOLIDWORKS 3DEXPERIENCE	Autodesk Fusion	Siemens NX	PTC Creo	Altair Inspire

The Five Categories of AI in Engineering

AI for mechanical engineering spans five distinct capability areas — each solves a different workflow bottleneck.

01
Search & Knowledge AI

Find existing parts and decisions across vaults and PDM systems [2]

02
Generative & Topology Optimization

Constraint-based geometry generation for weight, strength, and manufacturability targets.

03
AI-Assisted Simulation

Automated FEA setup, mesh refinement, and result interpretation.

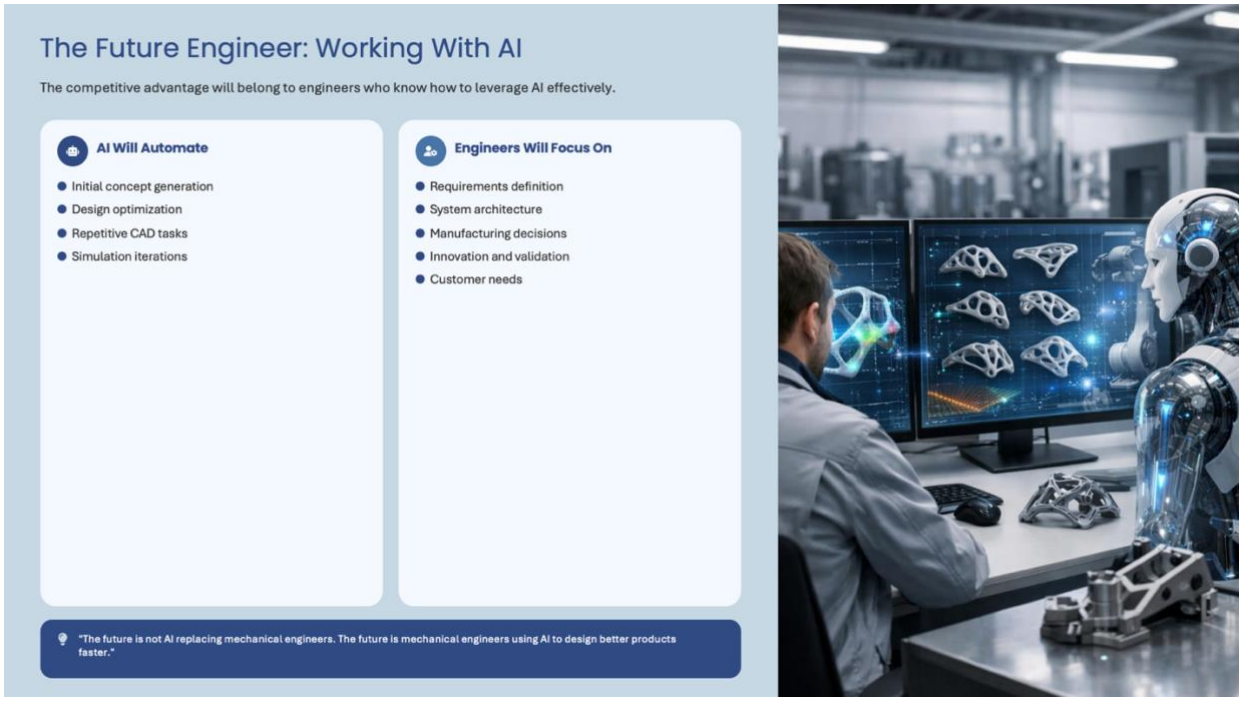
04
Design Review AI

Automated compliance and quality checking across design standards.

05
Manufacturing Intelligence

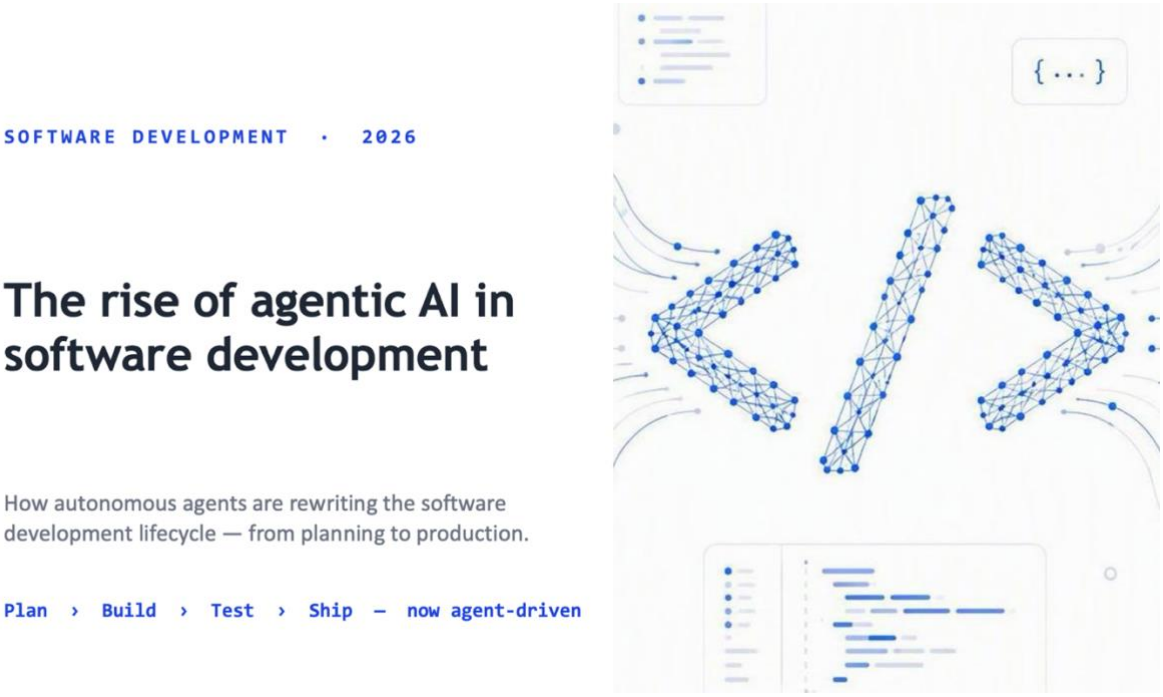
DfM analysis, cost estimation, and toolpath generation.

No single tool covers all five — the highest-ROI starting point depends on your team's actual bottleneck [2]



. New Trends in Software Engineering

by Hovhannes Hovhannesyan, NI



The SDLC we've always known

Six sequential phases. Each handoff adds delay — and the real bottleneck was decision-making, not tooling.

01	02	03	04	05	06
Plan	**Design**	**Develop**	**Test**	**Deploy**	**Maintain**
Scope, feasibility, requirements	Architecture and specifications	Engineers write every line	Manual and scripted QA cycles	Release into production	Fixes, patches, firefighting

3-12 months

Typical time to ship a release, traditionally

"Our pipelines were automated, but the decisions behind them were not. The real bottleneck was how we made decisions, not the tools."

Traditional SDLC phases: plan, design, develop, test, deploy, maintain.

In 30 months, agents went from 2% to 78%.

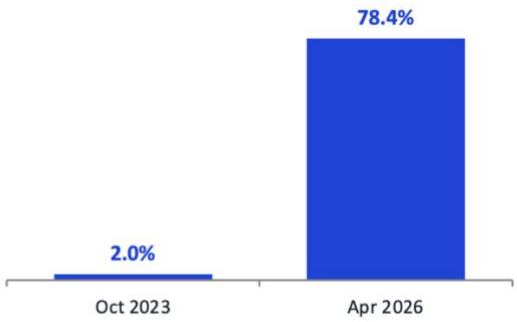
Copilot finished your line. Agents finish the feature.

Early assistants completed a line or a function. Modern agents — Claude Code, Codex, Devin, Jules — plan and act across whole repositories, features, and algorithms.

55.8% faster

Developers using an AI assistant vs. those without, in a controlled 95-developer study.

Real GitHub issues an AI agent can resolve on its own



SWE-bench Verified, Oct 2023 → Apr 2026. Agents referenced: Claude Code, OpenAI Codex, Devin, Google Jules.

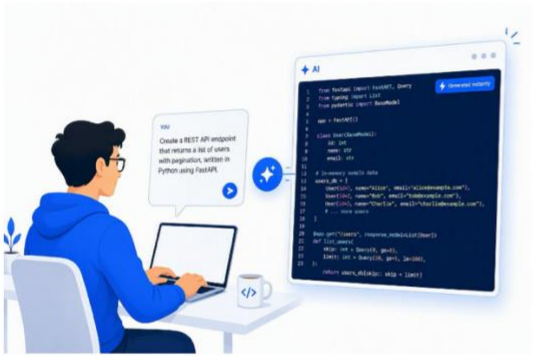
The agentic SDLC: AI as teammate, not tool

Specialized agents co-own planning, coding, testing and release. The human sets intent and reviews — the process shifts from sequential to symphonic.

	Traditional SDLC	With agentic AI
Cadence	Sequential, phase by phase	**Parallel and continuous**
Who writes the code	Humans, line by line	**Agents draft; humans review diffs**
The human's role	Author and operator	**Director, architect and reviewer**
Time to ship	Months	**Days to weeks**

Productivity: controlled studies, 2024–2026. Task-adoption: Anthropic economic analysis, 2026.

Vibe Coding



Coined by Andrej Karpathy (Feb 2025): describe intent in plain language, and the model writes the code. You guide, test and accept diffs rather than author them.

"The hottest new programming language is English."

- Collins English Dictionary Word of the Year, 2025
- ~41% of new code on GitHub is now AI-assisted (late 2025)
- ~75% of developers already vibe code to some degree

$8.5B → $35-45B agentic AI market by 2030

The catch: 80%+ of functionally-correct vibe-coded snippets carried critical security flaws. Speed is real — so is the risk.

Sources: Karpathy (2025); Collins; GitHub Octoverse (2025); SUSVIBES security benchmark (2025).

THE UNCOMFORTABLE QUESTION

So why are we still hiring people to write code?

Agents now resolve most real-world issues on their own, and English is fast becoming the programming language. So do we still need the people who used to write the code?

SWE-bench Verified: 2% agent-solved in 2023 → 78% in 2026.

Next Phase for humans

Vibe Code

Agents handle much of the routine coding; humans focus on decisions machines can't make.

Vibe-Ops

Review, testing and governance ("VibeOps") become the discipline that keeps velocity safe.

Orchestrator or obsolete

Set the intent, compose agents, own architecture and review — not every keystroke.

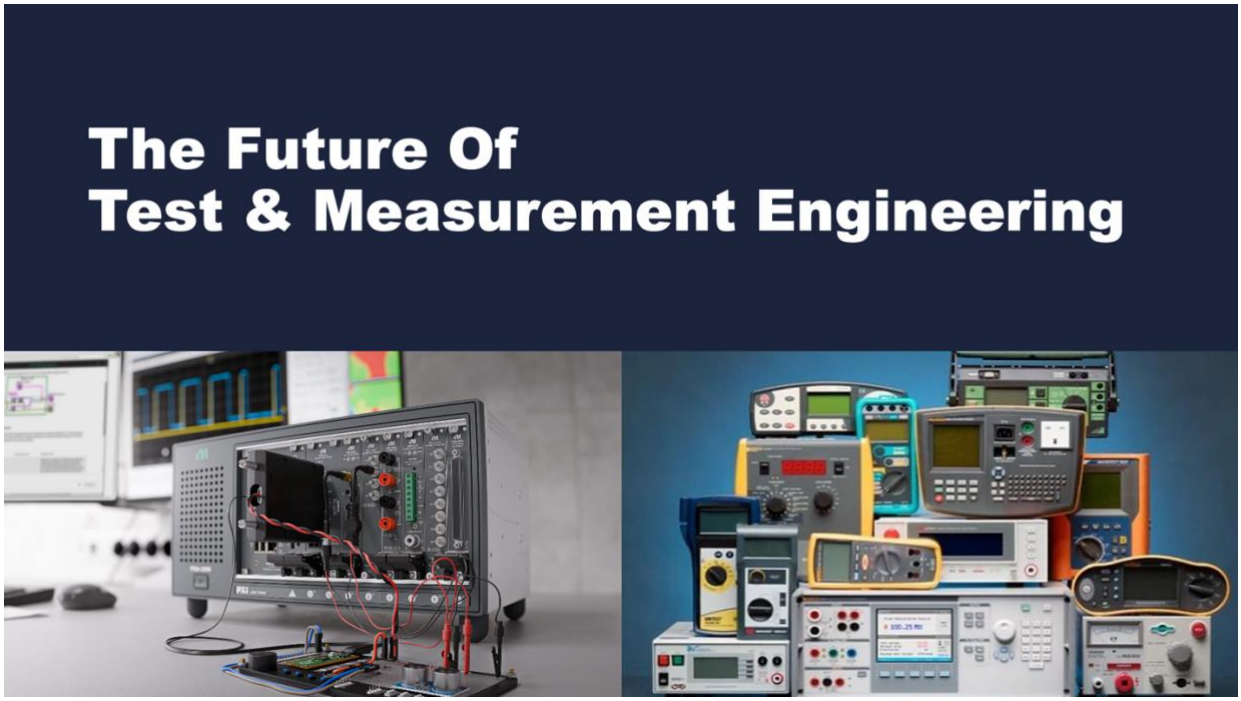


What comes next, 2025–2030

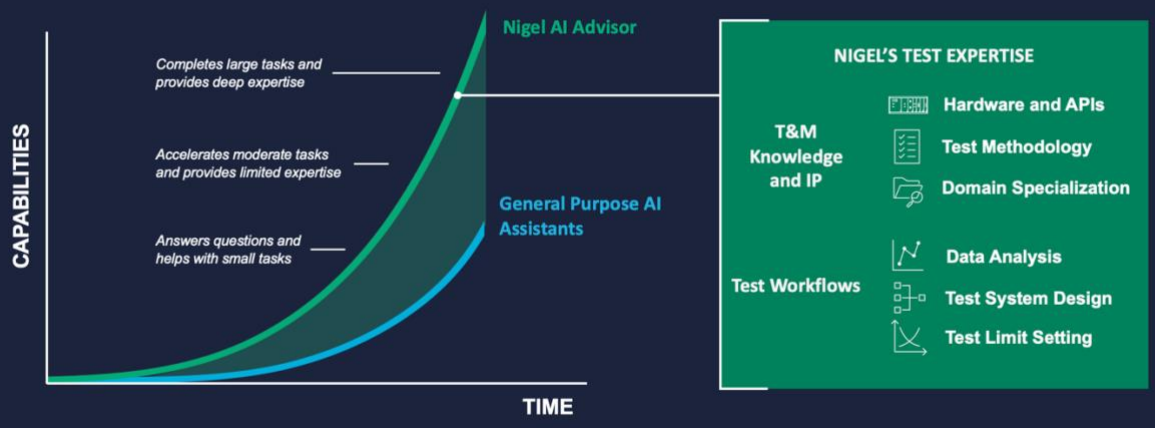


[. New Trends in Test & Measurement Engineering]

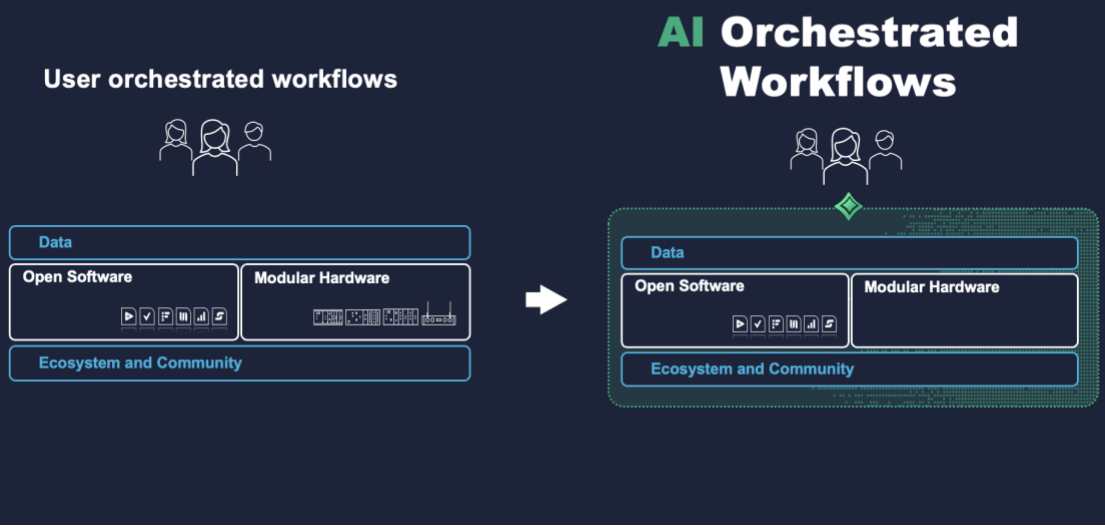
by Arsen Arustamyan, NI



AI WILL CHANGE HOW WE DO TEST & MEASUREMENT

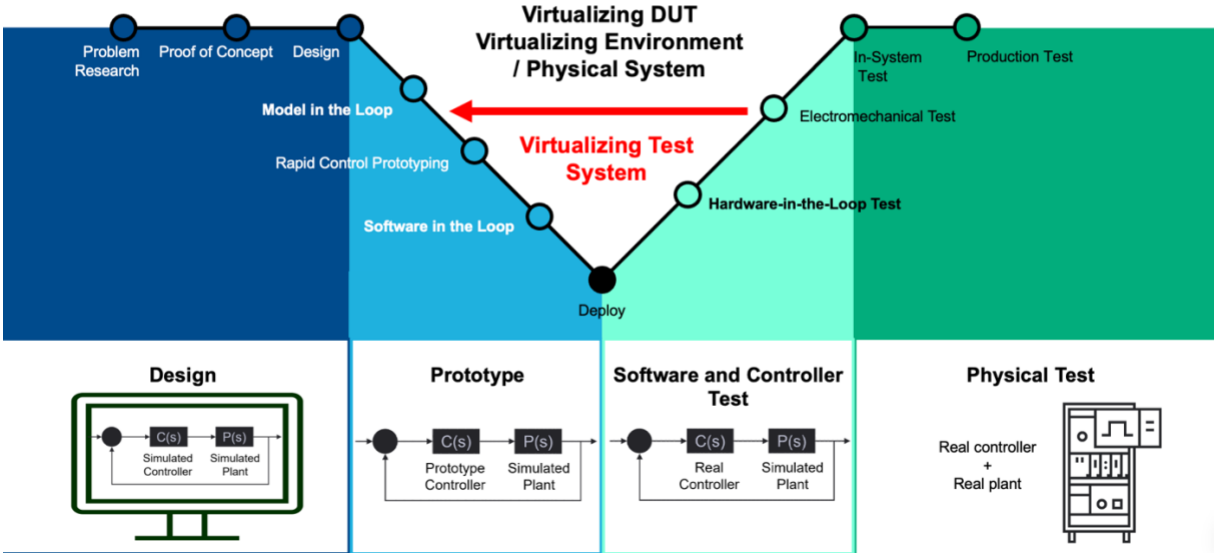


End-to-End Test Workflow Orchestrations



Testing Early and Often Before Start of Production

Product Development Life Cycle



Now

***Engineers** Developed and Delivered Test & Measurement Systems*

In Near Future

Engineers Develop T&M Agents

T&M Agents Develop and Deliver Test & Measurement Solutions

. New Trends in Manufacturing Engineering

by Narbeh Nahapetyan, YEA Engineering





AI in Manufacturing

From Smart Factories to
Physical AI and Dark Factories

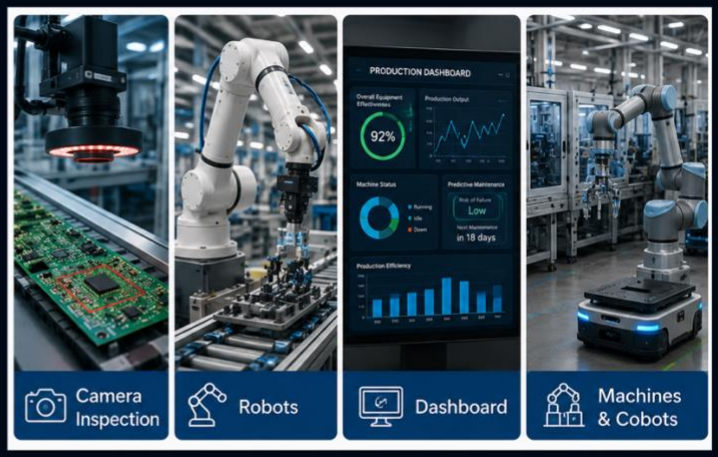


Key Messages

- ✓ Manufacturing is changing faster than ever.
- ✓ AI is becoming a core technology rather than an optional tool.
- ✓ Let's explore the future of manufacturing.

What is AI in Manufacturing/Production ?

- **Learn from data**
  AI analyzes production data to improve performance.
- **Detect defects**
  Vision& ML systems identify product defects automatically.
- **Predict failures**
  AI predicts equipment failures before they occur.
- **Optimize production**
  Improve quality, speed and resource utilization.
- **Support decision making**
  Provide recommendations using real-time data.



AI transforms manufacturing by converting production data into intelligent decisions.

Examples of AI in Manufacturing

AI is transforming every stage of the manufacturing process.



AI Vision Inspection
✓ Detect defects automatically



Predictive Maintenance
✓ Predict failures before breakdown



Production Optimization
✓ Improve quality and efficiency



Supply Chain
✓ Forecast demand and inventory

AI helps manufacturers produce better products, faster, with lower cost and higher quality.

SMART MANUFACTURING

Smart Manufacturing connects machines, people, sensors, and software to make better decisions.

KEY ENABLERS

- IoT Connectivity
- Data Management
- AI & Analytics Intelligence
- Cybersecurity Protection

CLOUD	Data storage, analytics and global access
ERP / BUSINESS SYSTEMS	Plan, manage and optimize resources
MES (MANUFACTURING EXECUTION SYSTEM)	Monitor, track and control production
MACHINES & EQUIPMENT	Connected machines and automation
SENSORS & DEVICES	Collect real-time data from the shop floor



Smart Manufacturing creates a connected and intelligent ecosystem that improves **efficiency**, **flexibility**, **quality**, and **decision making**.

PHYSICAL AI

Physical AI brings intelligence into machines that interact with the real world.

WHAT IS PHYSICAL AI?

Physical AI integrates AI with sensing, perception, decision-making and control to perform tasks in the real physical world.

TRADITIONAL AI vs PHYSICAL AI

TRADITIONAL AI		PHYSICAL AI
THINKS	VS	THINKS AND ACTS
Analyzes data, makes predictions and generates recommendations.		Perceives the real world, makes decisions and takes physical actions.

EXAMPLES OF PHYSICAL AI



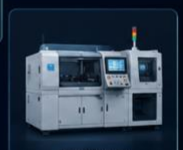
Humanoid Robots



Cobots



Autonomous Mobile Robots



Intelligent Production Equipment

Traditional AI thinks.
Physical AI thinks and acts.

Perceive → Think → Decide → Act

DARK FACTORY

A factory capable of operating without human presence.



LIGHTS CAN LITERALLY REMAIN OFF

Because no people are required.

No People. No Lights.
Just Intelligence.

KEY ENABLERS

ROBOTS	AGVs	AUTOMATED STORAGE	AI INSPECTION	PREDICTIVE MAINTENANCE
Automated robots perform production tasks precisely.	Autonomous vehicles move materials throughout the factory.	Smart storage systems automatically store and retrieve materials.	AI vision systems inspect quality in real time with zero human intervention.	AI predicts equipment issues before they happen and schedules maintenance.

A DARK FACTORY IS A FULLY AUTOMATED, INTELLIGENT ECOSYSTEM
WHERE PRODUCTION NEVER STOPS.

COMPARISON

Traditional Factory vs Dark Factory

ASPECT	TRADITIONAL FACTORY		DARK FACTORY
OPERATION	Human-operated with manual and semi-automated processes.	→	Fully automated and AI-driven processes.
HUMAN INVOLVEMENT	High – People required on the shop floor.	→	None – No people on the shop floor.
PROCESSES	Variable and dependent on human performance.	→	Consistent, precise and data-driven.
EFFICIENCY	Moderate – Subject to human limitations.	→	High – Continuous optimization.
QUALITY	Inconsistent – Subject to human error.	→	Consistent and high – AI inspection & control.
MAINTENANCE	Reactive – Performed after breakdown.	→	Predictive – Issues prevented before they occur.
COST	Higher operational costs.	→	Lower long-term operational costs.
OPERATING TIME	Limited – Operates in shifts.	→	24/7 – Continuous operation.

DARK FACTORY =
ZERO PEOPLE. ZERO INTERRUPTIONS. MAXIMUM PERFORMANCE.

CHALLENGES

Building a Dark Factory is not just about technology, it is about overcoming **real-world challenges**.

HIGH INITIAL INVESTMENT
Advanced robotics, automation and digital infrastructure require significant upfront cost.

SYSTEM INTEGRATION
Integrating robots, machines, software and data systems is complex and time-consuming.

CYBERSECURITY
More connectivity means more risk. Protecting data and systems is critical.

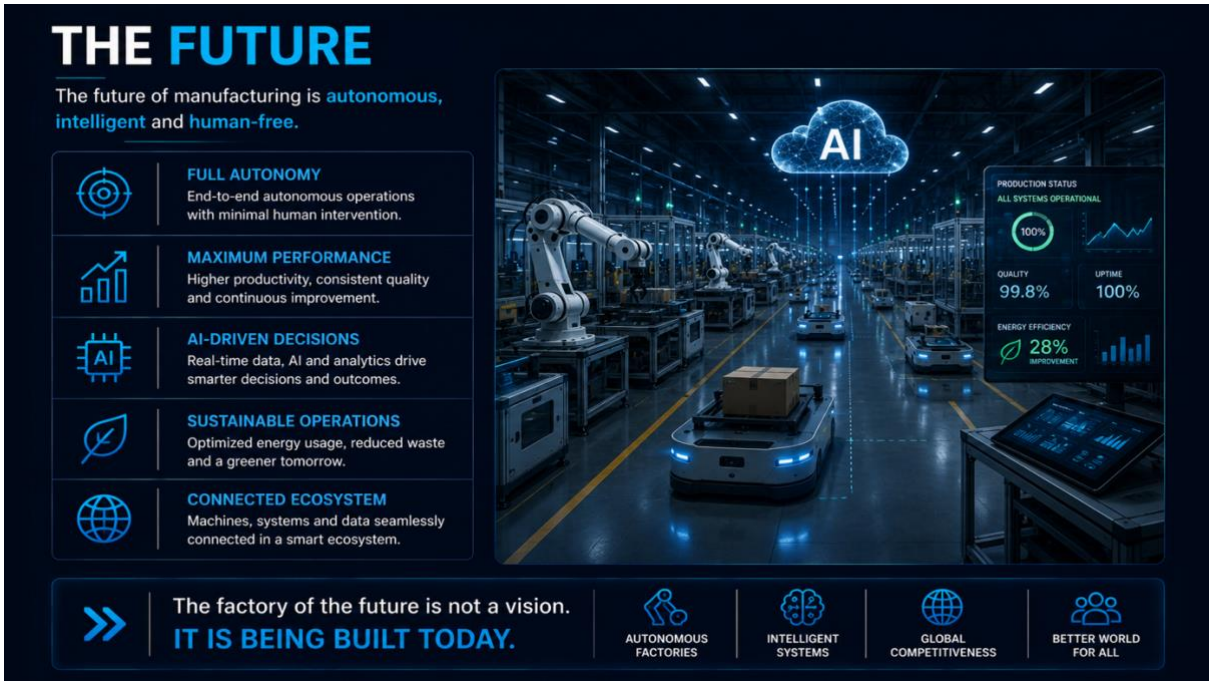
SKILLS & WORKFORCE TRANSFORMATION
New skills are required. Reskilling and managing change is essential.

RELIABILITY & RESILIENCE
Systems must be highly reliable with minimal downtime in a fully unattended environment.



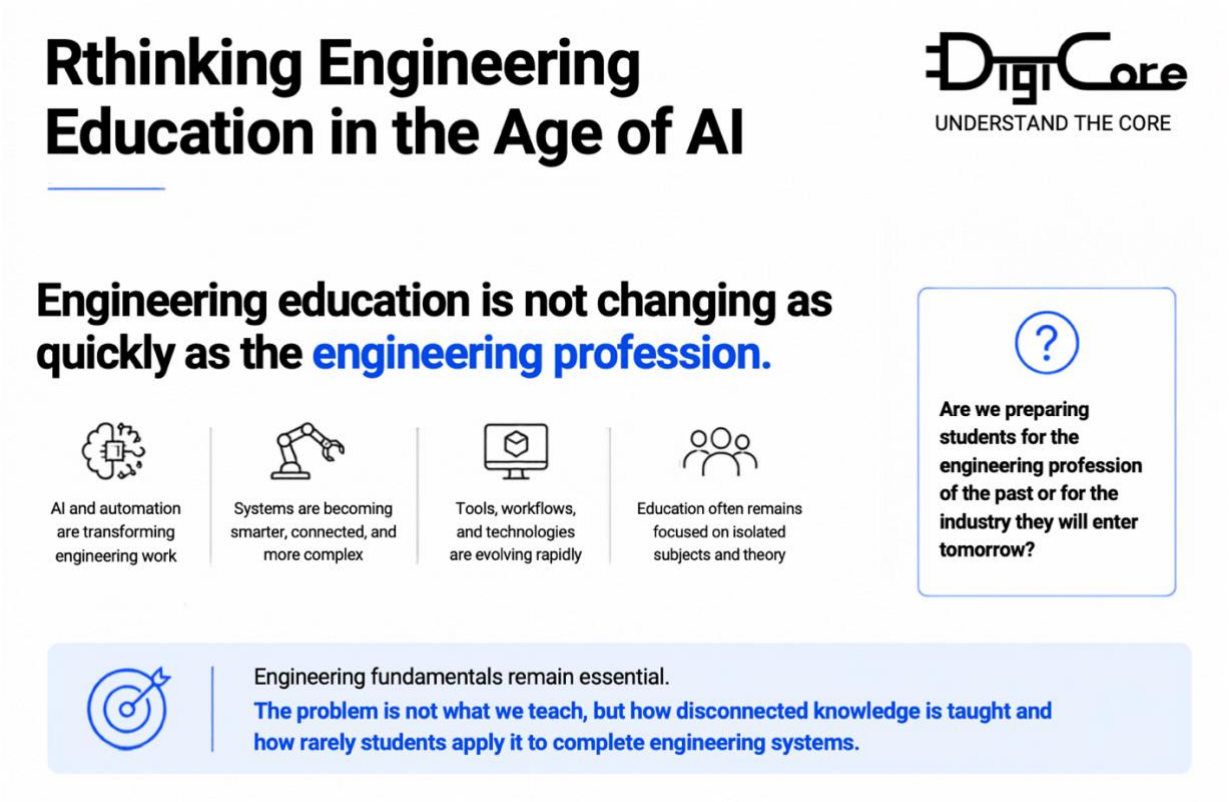
The goal is not just automation,
but autonomous, intelligent and resilient operations.

Challenges today.
Competitive advantage tomorrow.



. New Trends in Engineering Education

by Grigor Shirinyan, DigiCore

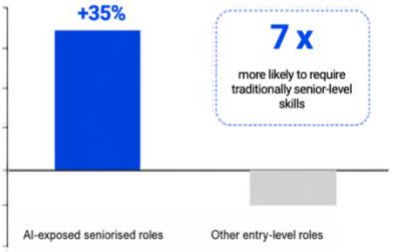


INDUSTRY AND JOB REQUIREMENTS HAVE CHANGED

DigiCore
UNDERSTAND THE CORE

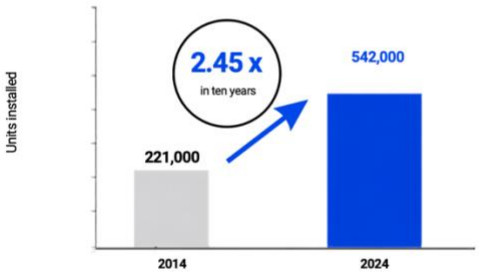
ENTRY-LEVEL WORK IS BECOMING MORE DEMANDING

Change in U.S. entry-level job openings since 2019



ENGINEERING INDUSTRY IS BECOMING MORE AUTOMATED

Industrial robots installed worldwide



Routine technical tasks are increasingly supported by AI and automation.

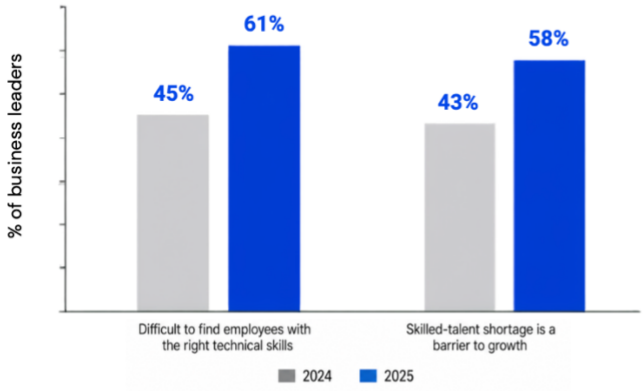
New engineers need more than isolated technical knowledge — they need AI literacy, system thinking, practical experience, and the ability to make and defend engineering decisions.

THE SKILLS GAP IS WIDENING

DigiCore
UNDERSTAND THE CORE

Industry cannot find the skills it needs.

BUSINESS LEADERS REPORT GROWING DIFFICULTY FINDING SKILLED TALENT



THIS IS NOT ONLY A SHORTAGE OF GRADUATES.

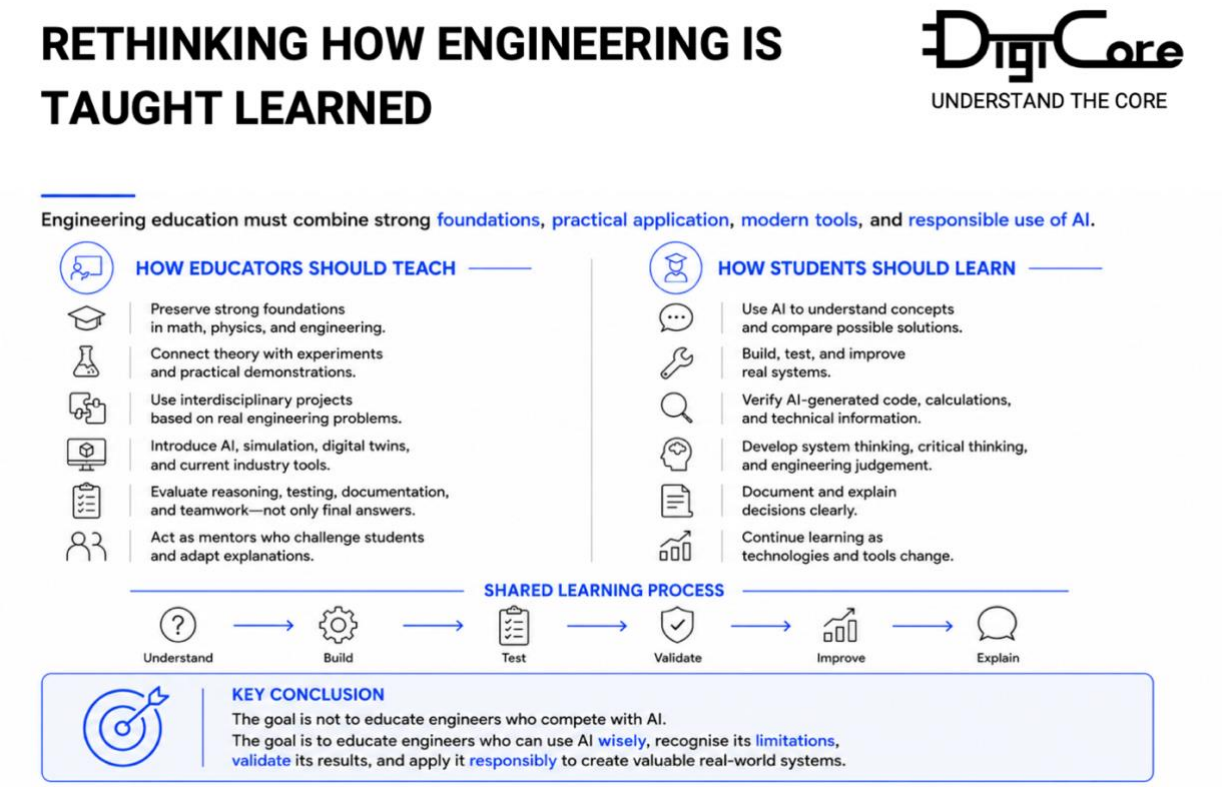
Companies struggle to find people who can combine technical knowledge with modern tools and practical problem-solving.

SKILLS OFTEN MISSING

- Applying theory to real problems
- Combining multiple engineering disciplines
- Using modern engineering and AI tools
- Testing and validating results
- Communicating and documenting decisions
- Working independently and in teams

KEY TAKEAWAY:

Industry needs engineers who can integrate knowledge, not only reproduce it.



. New Trends in Aerospace Engineering

by Hrachoohi Boghosian, CIPR



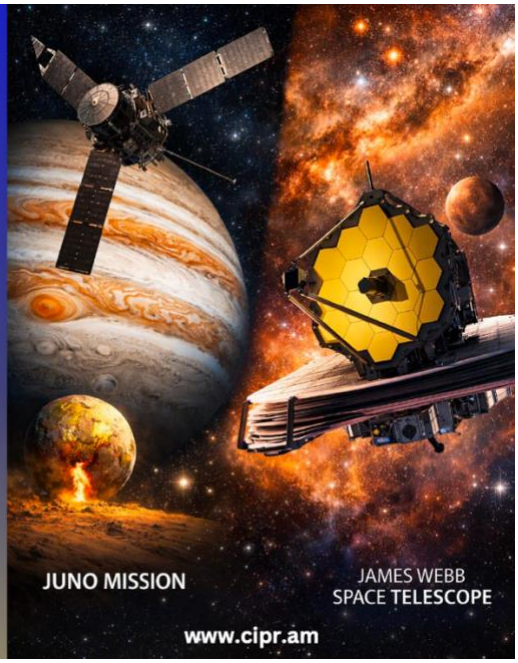


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Նորարար է, կիրառող է և
ձգտում է դեպի Տիեզերք



AI-ի 5 շերտերը

1. Էներգիա (Energy)
2. Չիպեր (Chips)
3. Ենթակառուցվածք (Infrastructure)
4. Մոդելներ (Models)
5. Կիրառություններ (Applications)

Ավիատիեզերական ինժեներության մեջ AI-ը հանդիսանում է ԳՈՐԾԻՔ՝ Տիեզերքը ուսումնասիրելու բացահայտելու և նվաճելու

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Areas of Aerospace Engineering where AI is already in use

- Space Power Generation
- Space Data Centers
- In-space satellite manufacturing
- Real-time navigational Intelligence
- Real-time environmental modeling
- Quantum technology in space
- Propulsion systems & in-space monitoring on orbit
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Հայաստանը կարող է դիրքավորվել որպես տարածաշրջանային ինքնավար նանոարբանյակների նախագծման, առաքելությունների կառավարման եւ կրթության նպատակով կենտրոն՝ համադրելով ԱԲ-ն բազմալեզու համակարգեր:

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ՀՀ-ում AI-ը զարգանում է

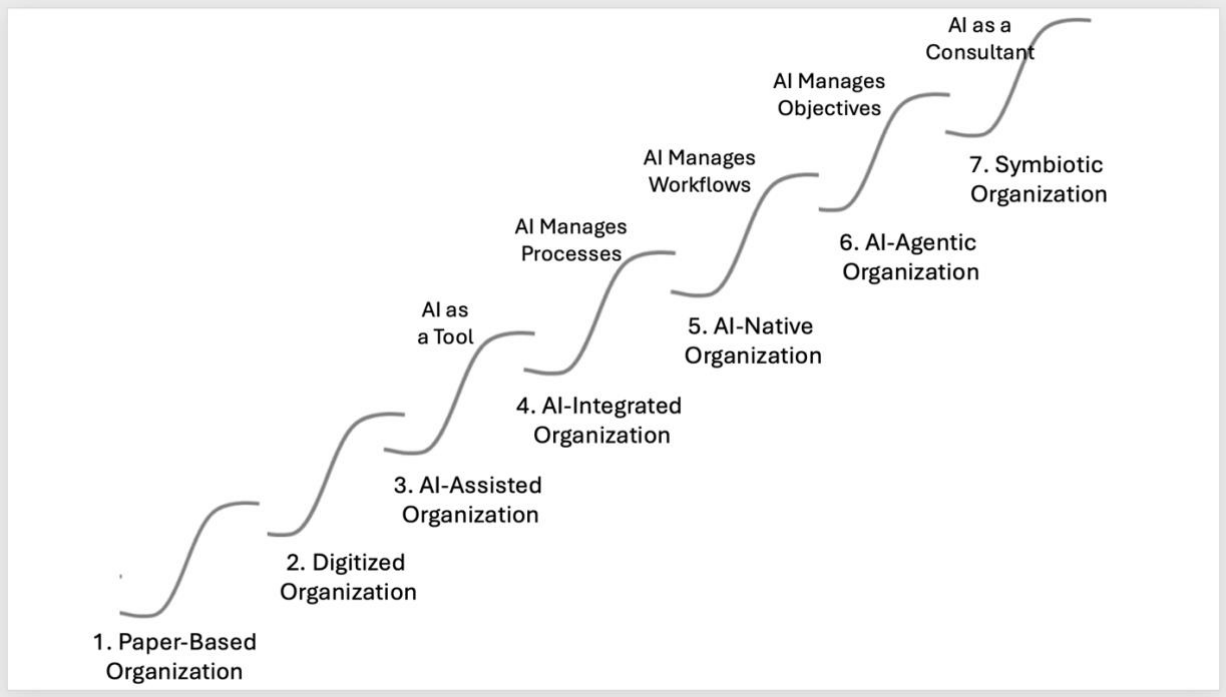
- Չիպերի արդյունաբերություն - նախագծում և գործիքավորում
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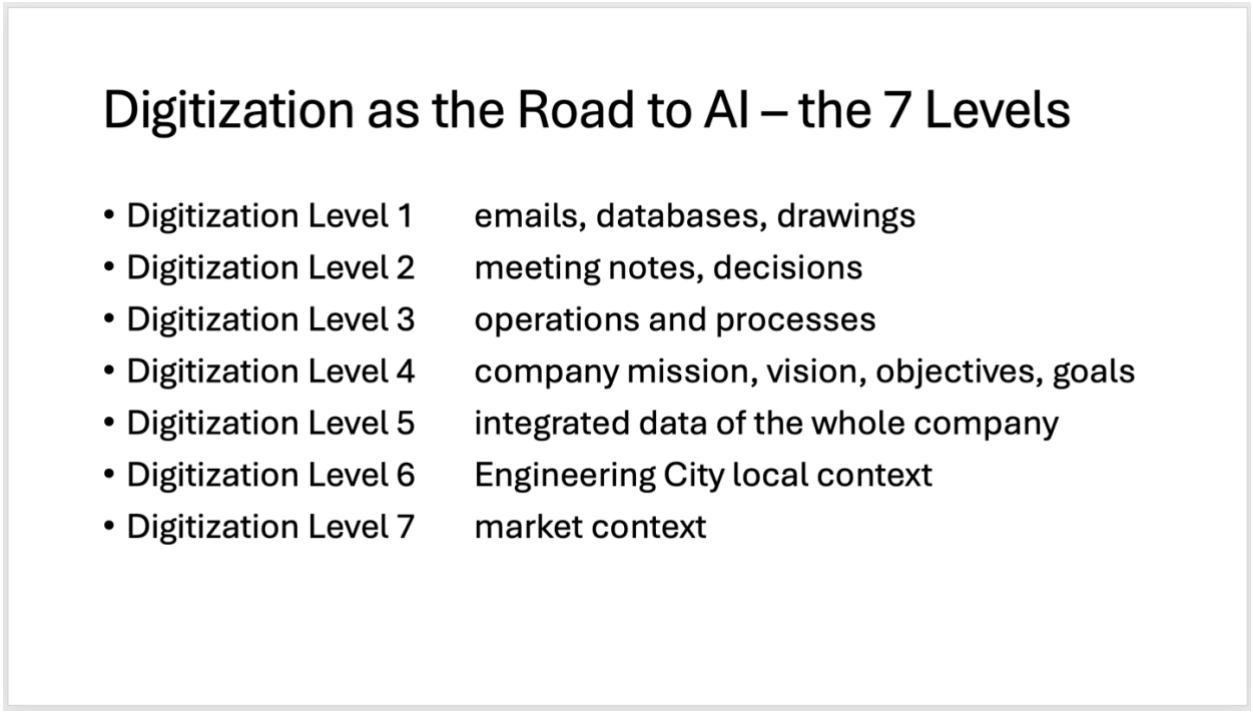
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