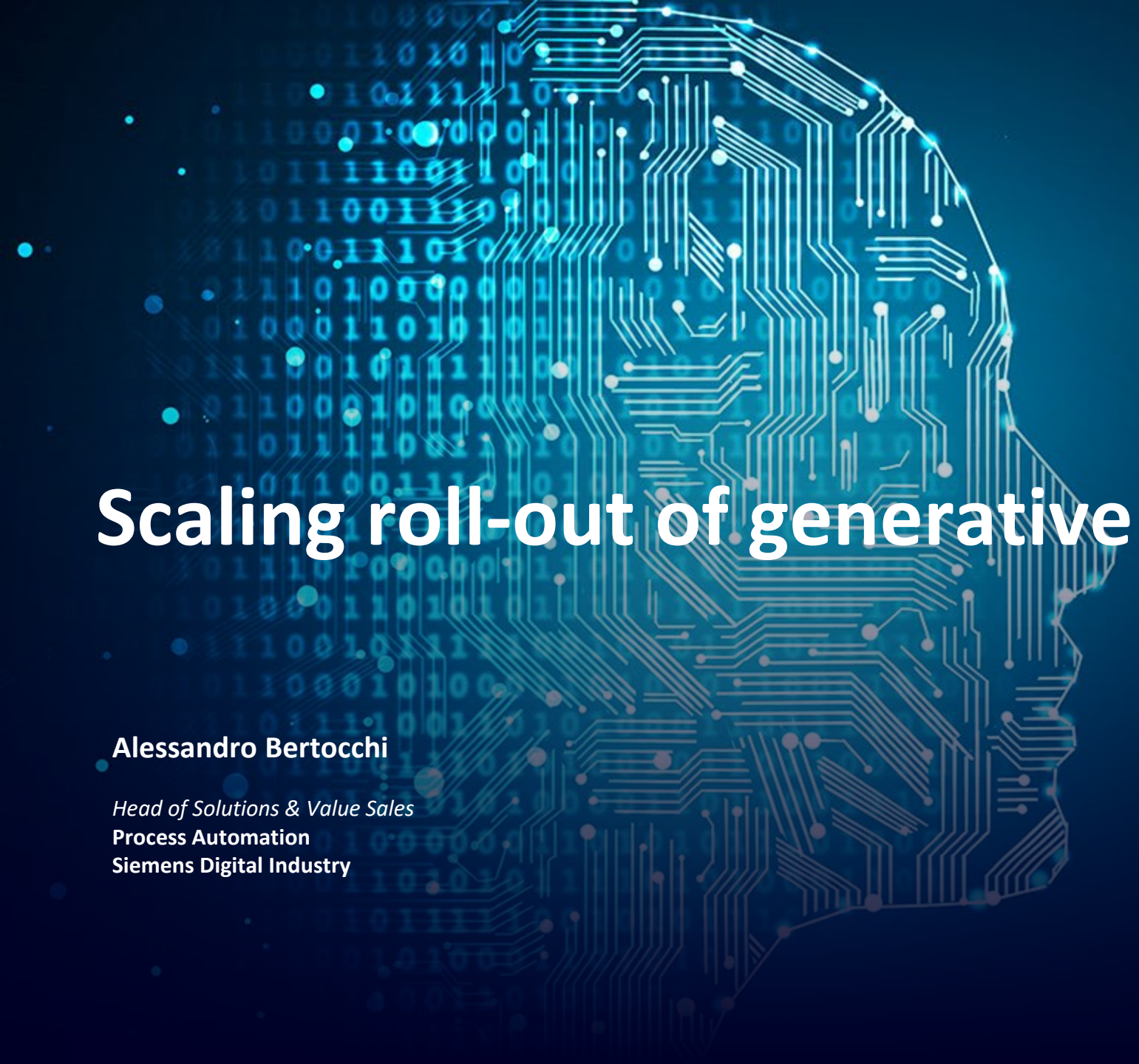

Scaling roll-out of generative AI

Alessandro Bertocchi

Head of Solutions & Value Sales
Process Automation
Siemens Digital Industry

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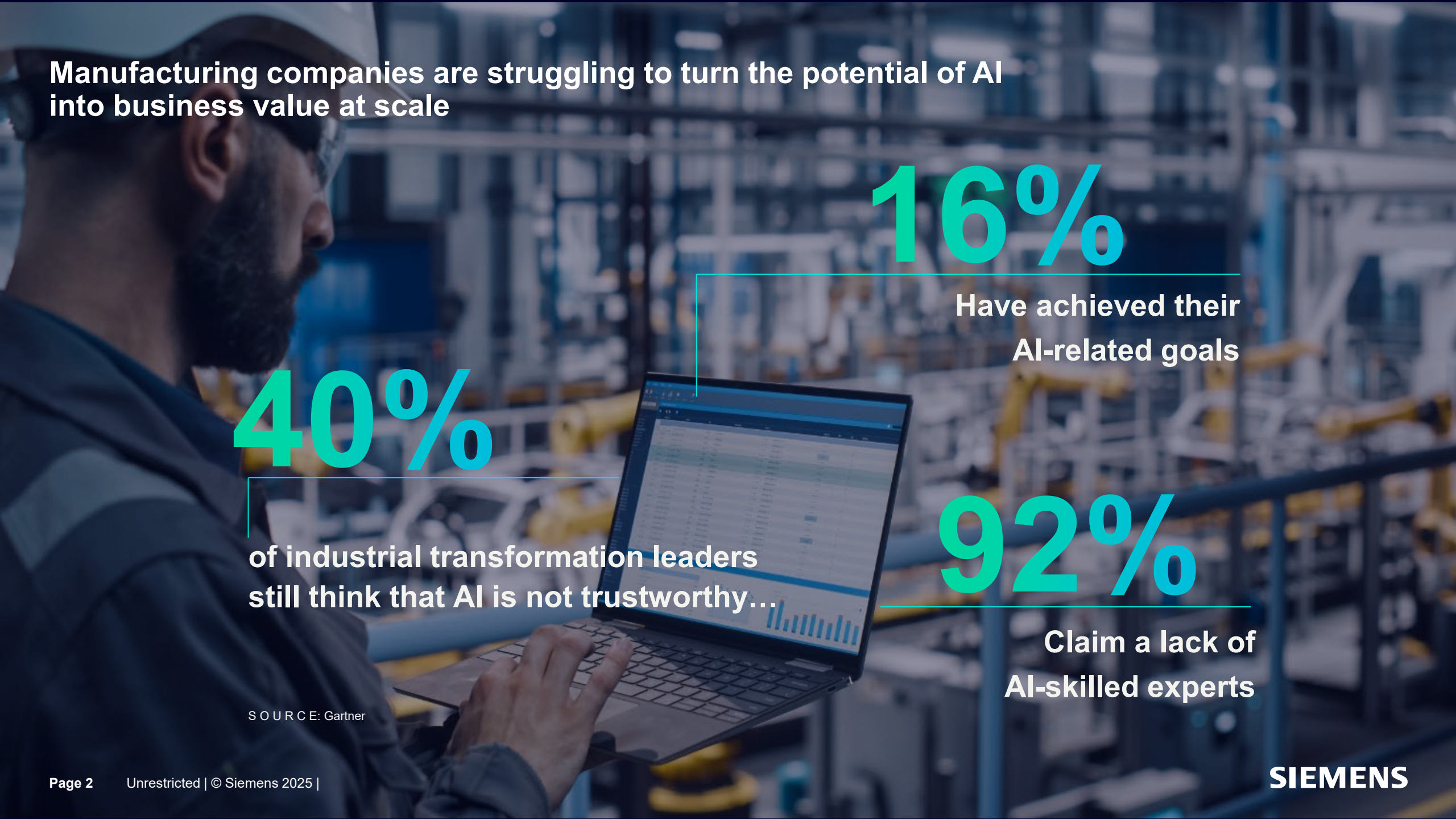
Manufacturing companies are struggling to turn the potential of AI into business value at scale



16%

Have achieved their AI-related goals

40%

of industrial transformation leaders still think that AI is not trustworthy…

92%

Claim a lack of AI-skilled experts

SOURCE: Gartner

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Making AI ready for industry

AI for industrial applications differs significantly from AI used in commercial settings. It must meet the rigorous requirements and standards of the most demanding industrial environments.

AI in industry must be industrial-grade:

- **Robust**

  Driving collaboration to achieve reliable, secure, and trustworthy AI for industry

- **Democratized**

  Making Industrial AI accessible to everybody, anywhere, and anytime

- **With Purpose**

  Supporting companies to achieve their scalability, quality, and sustainability targets

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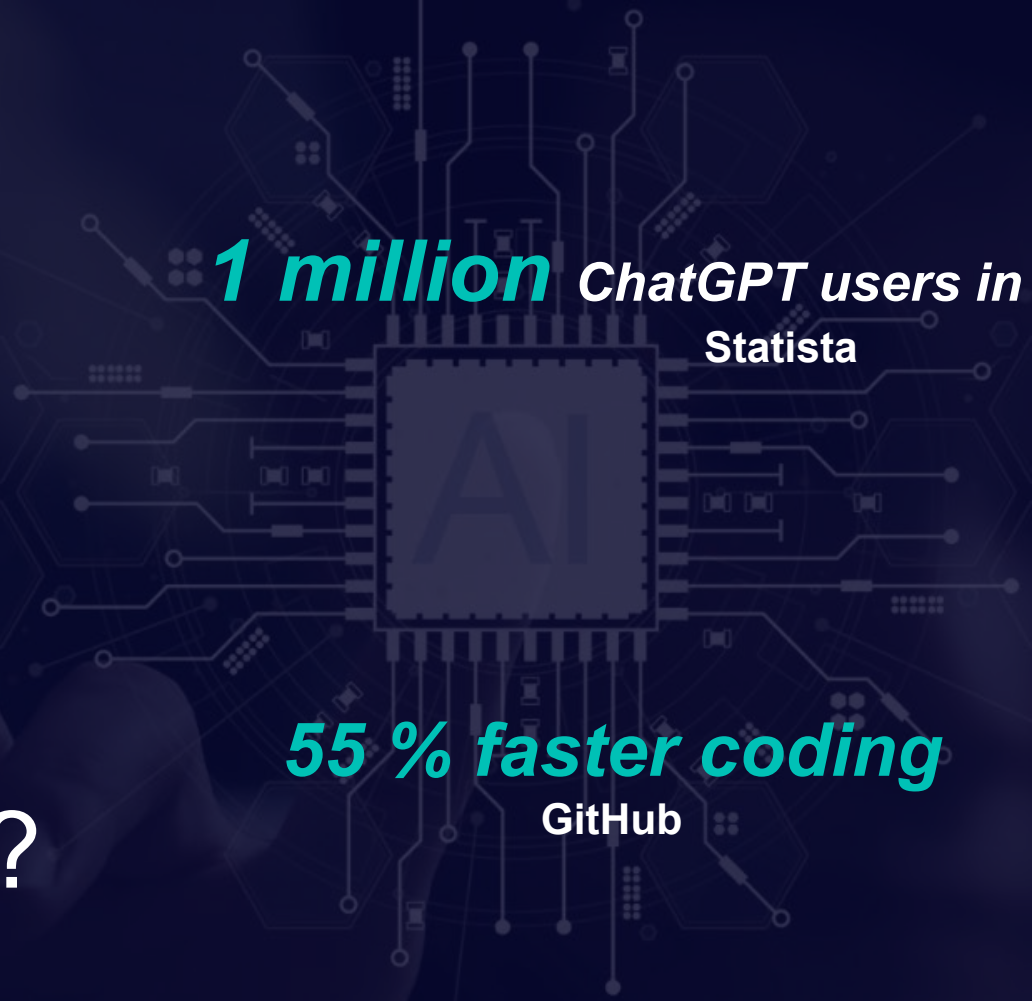
What is the **Generative AI trend** all about?



1 million** ChatGPT users in **five days
Statista

55 % faster coding
GitHub

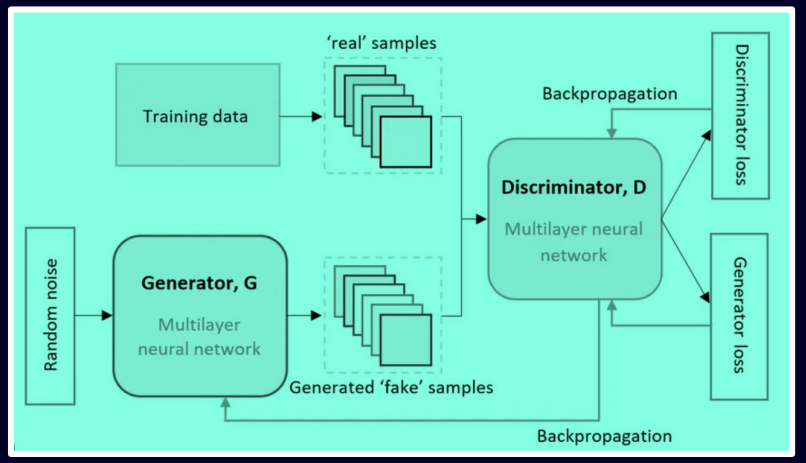
Generative AI will be everywhere
Gartner

Generative AI adds new dimension to productivity we are just beginning to understand
Forbes

SIEMENS

Generative AI in short

Generative AI is a type of artificial intelligence that leverages deep learning models, such as **LLMs (Large Language Models)**, trained on massive datasets to generate new content based on user inputs. These models represent the next generation of AI, as they do not merely process existing data but can create original text, images, and other content.



Generative AI relies on two main architectures:

- **Generative Adversarial Networks (GANs):** Two competing neural networks—a generator and a discriminator—used primarily for generating realistic images, videos, and audio.

- **Transformer Architectures**: Power models like GPT, excelling in tasks such as text generation, summarization, and question answering, using attention mechanisms to handle large data sequences. They work by using attention mechanisms to process and understand large sequences of data.

Popular tools like **ChatGPT** and **Microsoft Copilot** generate human-like text. Image and video generation increasingly depend on **Diffusion Models**, which have emerged as more effective than GANs in many applications. Unlike GANs, diffusion models gradually refine random noise into clear and coherent images, offering more consistent results.

Other technologies related to Generative AI include:

- Computer Vision / Image Recognition (often powered by GANs or Diffusion Models)
- Text-to-Image: A process where text descriptions are converted into images. This is primarily powered by Diffusion Models (e.g., DALL·E, Stable Diffusion)

AI-based predictive maintenance

Condition monitoring of an entire plant or multiple plants but even for a single machine it's always challenging due to the huge number of data and parameters. Therefore, predictive maintenance by manual analysis is too complicated and time-consuming, or even impossible.

As everybody knows, **Machine Learning** applications is the ideal solutions for data analysis because it can reliably detect patterns, contextualize findings, and make reliable maintenance recommendations for countless machines.

How GenAI can improve Predictive Maintenance ?

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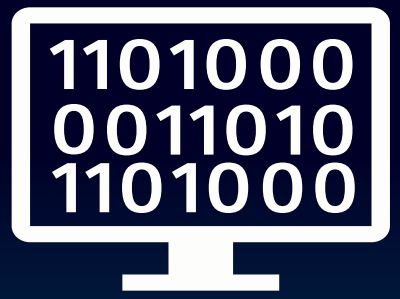
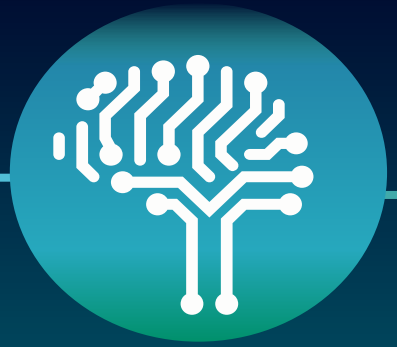
Integration of Data Driven and Case Based Reasoning



Data Driven Analytics



Case Based Reasoning

Retrieve – Reuse – Revise – Retain

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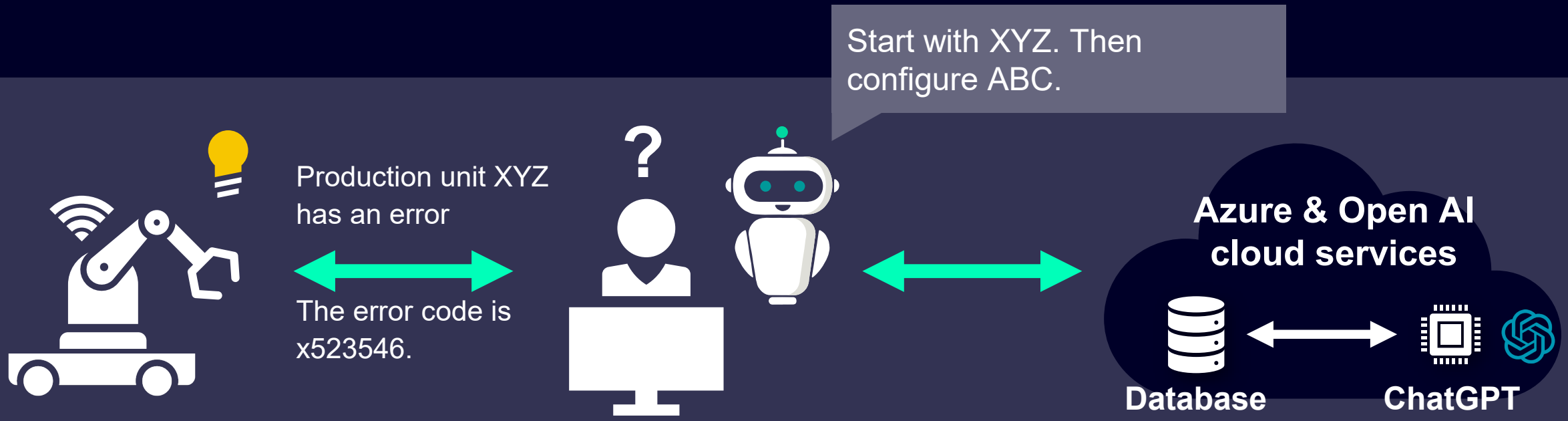
Industrial Copilot for Operation
Use case

Problem

Troubleshooting faults in automation systems can be a time-consuming and challenging task.



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Maintenance Copilot SENSEYE™

Maintenance Copilot SENSEYE is a revolutionary Generative AI-powered virtual maintenance assistant that simplifies decision-making for maintenance teams. It provides instant, easy-to-understand answers to questions, retains knowledge indefinitely, and is designed for non-technical staff. With comprehensive knowledge of all assets, it ensures critical information is always accessible, making maintenance management more efficient and informed.

Getting answers to all equipment related questions by GenAI tools interpreting data for better maintenance decisions making

Retain all knowledge forever capturing learnings as part of everyday workflow

Allow to share knowledge across people and locations by learning and referencing from all info sources

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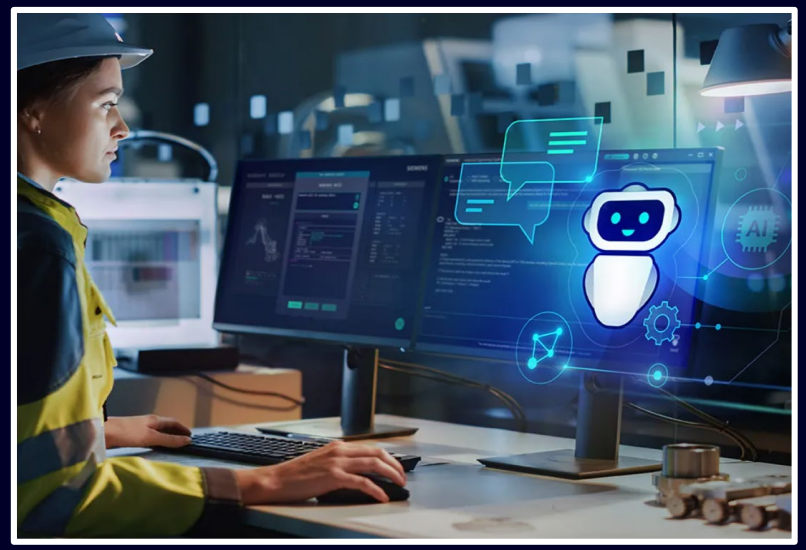
AI-based Automation Engineering

Generative AI will be a valuable tool for every engineer and an indispensable part of the future engineering process across all industries.

With GenAI, engineers will be able to delegate repetitive tasks to the AI, significantly reducing your workload and shortening development times.



How GenAI can help automation engineers' efforts?

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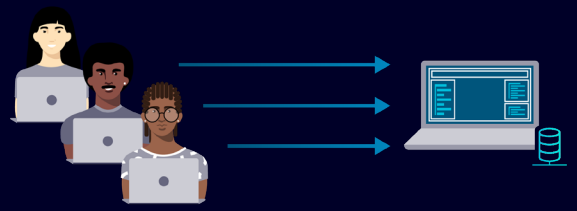
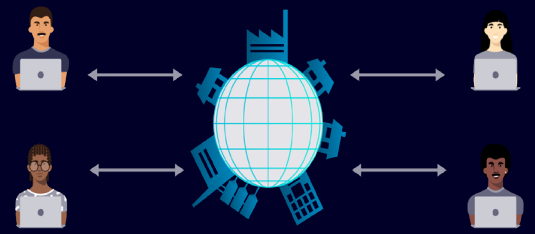
TIA (Totally Integrated Automation) Portal

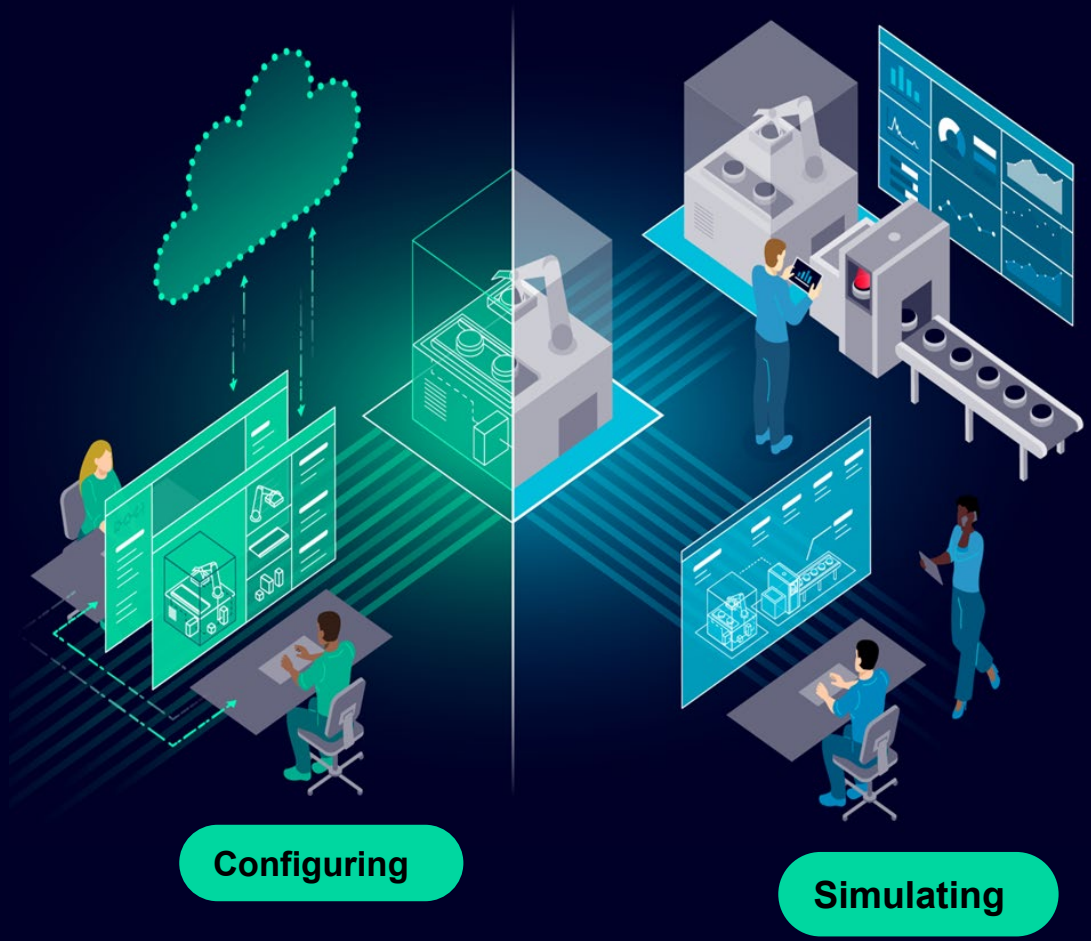


Parallelizing work processes
The parallel editing of different objects significantly reduce the project engineering and commissioning time.

Coordination
Central management of software changes and work distribution in addition to integrated library functions



Location-independent working
Assignment of users with read /write permissions provide a secure working environment from anywhere.



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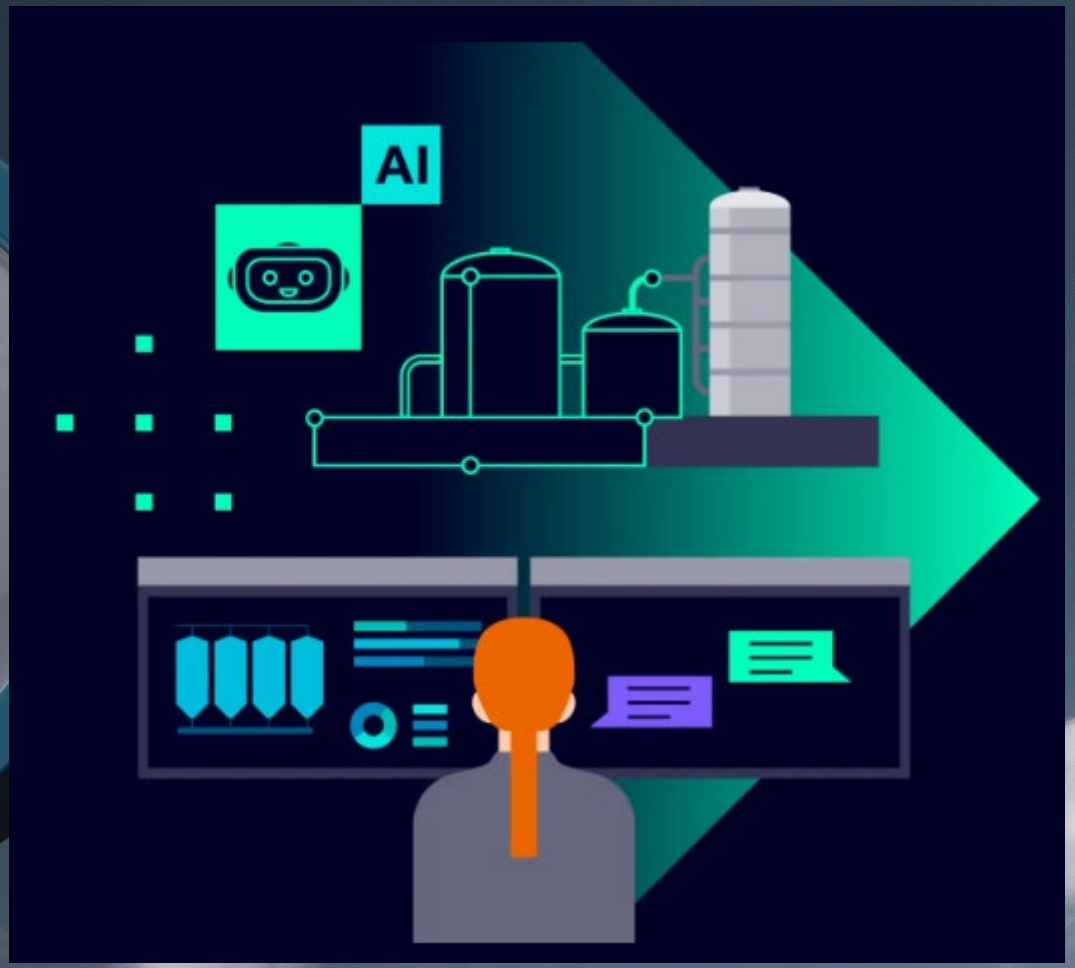
GenAI based Hydrogen Plant Configurator



Hydrogen Plant Configurator powered by Large Language Models (LLMs) offers unparalleled benefits:

- Seamlessly generate BFDs with precise plant unit layouts and interconnections.
- Instantly access critical metrics: electricity consumption, heat generation, and a comprehensive list of core components.
- Dive deep into your plant’s configuration.

Hydrogen Plant Configurator provides intricate insights, ensuring every component aligns perfectly.

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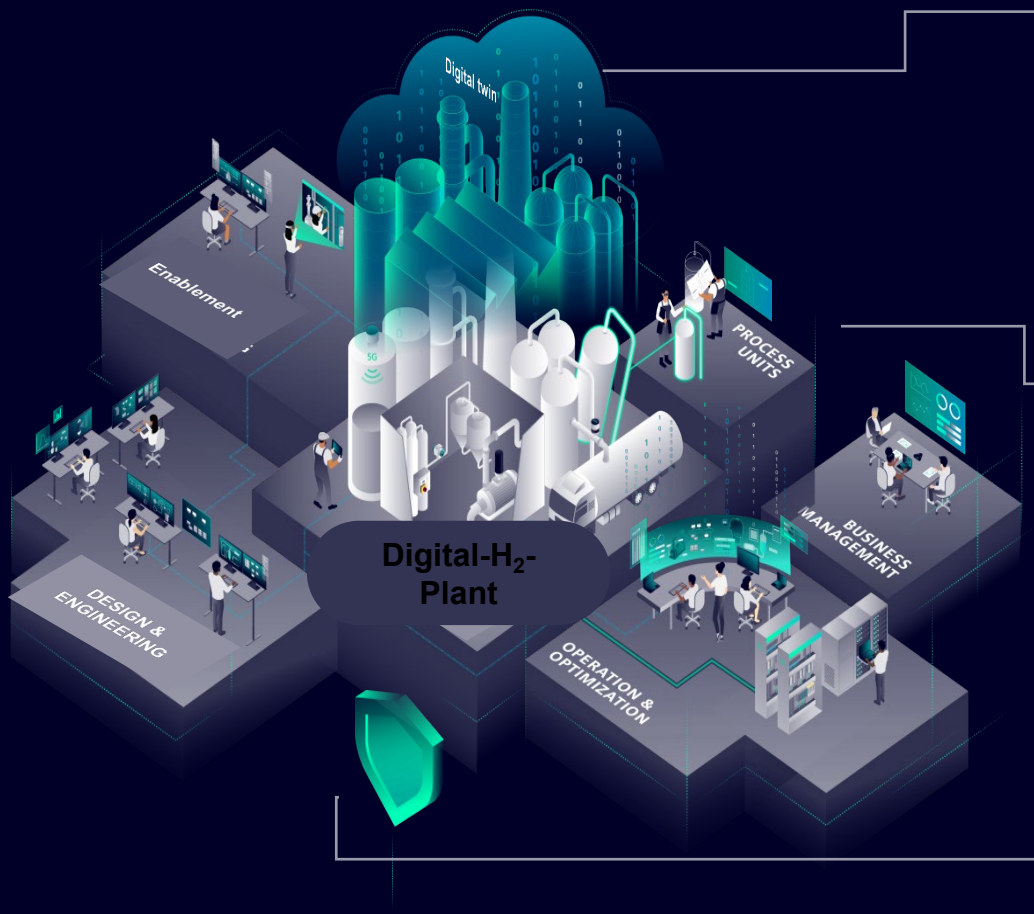
Using GenAI from planning to optimization



Requirement Definition

- Requirements for H2 plant via a LLM
- Automatic generation of Block Flow Diagram with plant units and connections
- Automatic generation of major in-/outputs including electricity consumption, heat generation, list of core components

Detailing of configuration

- Detailing based on LLM support
- Proactive Suggestions
- Picture-to-Diagram Magic
- Natural Language Descriptions

Handover

- Export of basic plant concept as PFD into COMOS and or gPROMS
- Information can be used to automatically create a P&ID via solution "Object creation in COMOS"

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Industrial Copilot
In summary

Industrial Copilot for Operation

Quickly identify errors and optimization potentials in machines and systems and receive solution suggestions.

Industrial Copilot for Engineering

Generating, debugging, and documenting new code easily through natural language input

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THANK YOU

….a special thanks to Prof. Maurizio Rovaglio

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