

# Generative AI for the Industry: More than ChatGPT

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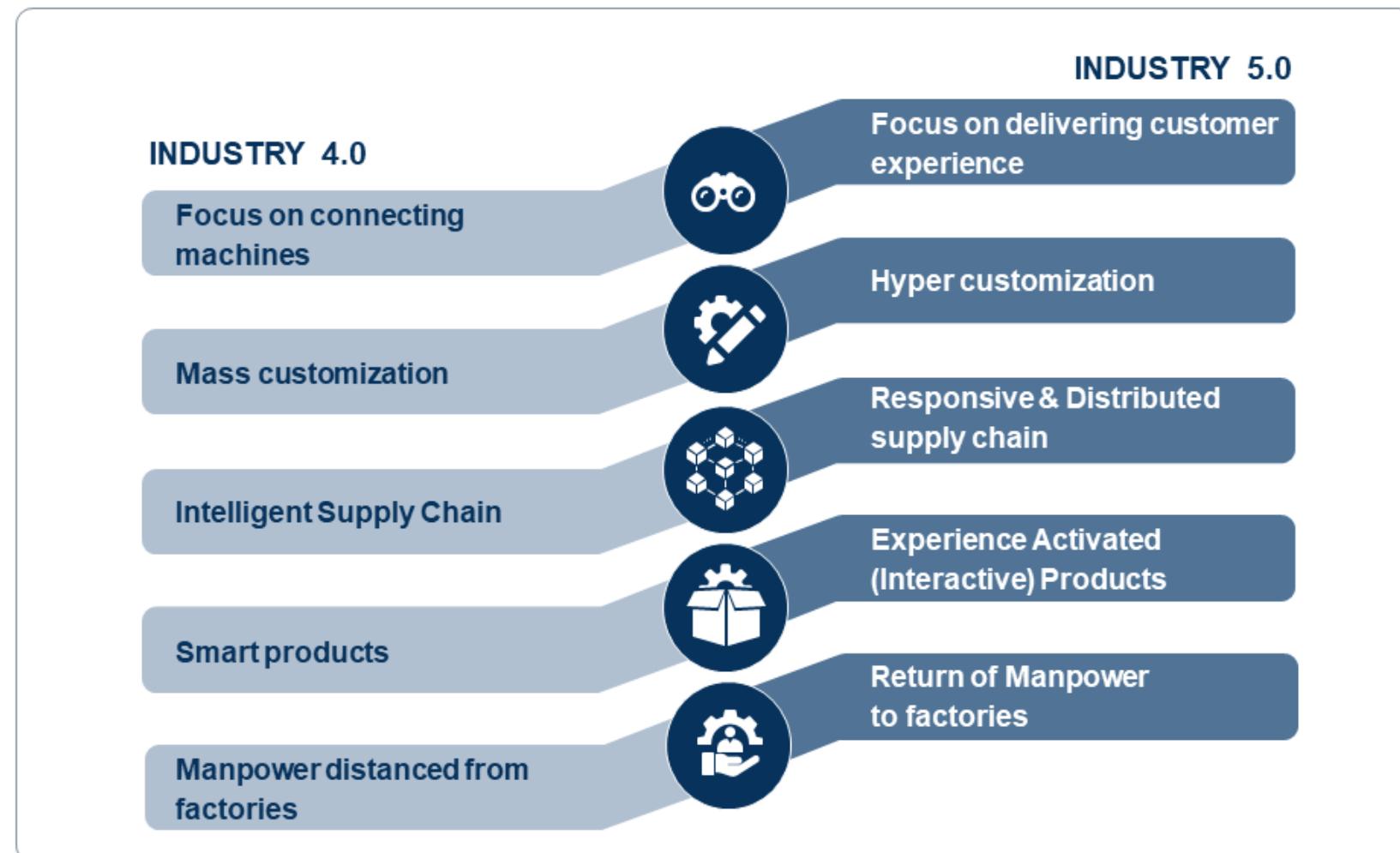
**Generativ/e**  
**Amsterdam**  
**AI Solutions**



# **Industry 4.0 → 5.0**

# The future of the industry

## Highlights of Industry 5.0 compared to Industry 4.0



# The future of the industry

Highlights of Industry 5.0 compared to Industry 4.0

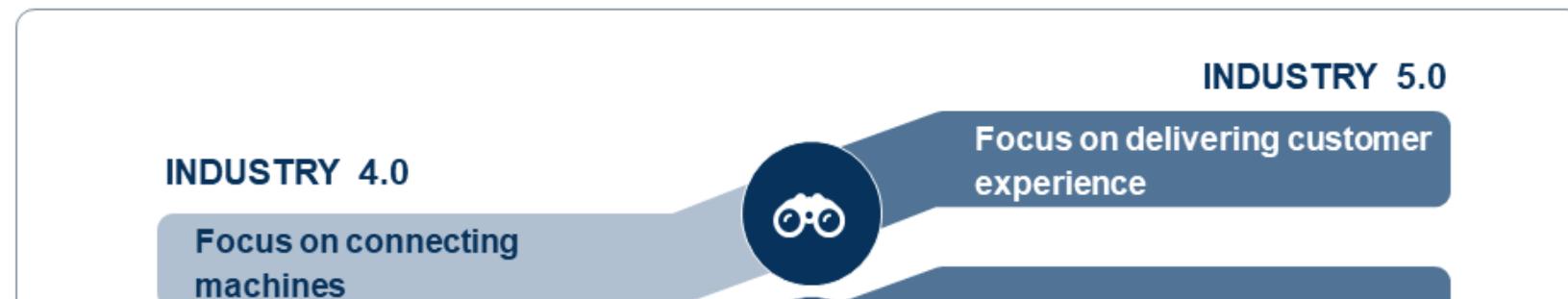


**How to make this transition?  
What is the key technology here?**



# The future of the industry

Highlights of Industry 5.0 compared to Industry 4.0



**How to make this transition?  
What is the key technology here?  
Generative AI!**



# **How Generative AI works?**

# Three pillars of Generative AI

**Probabilistic modeling**

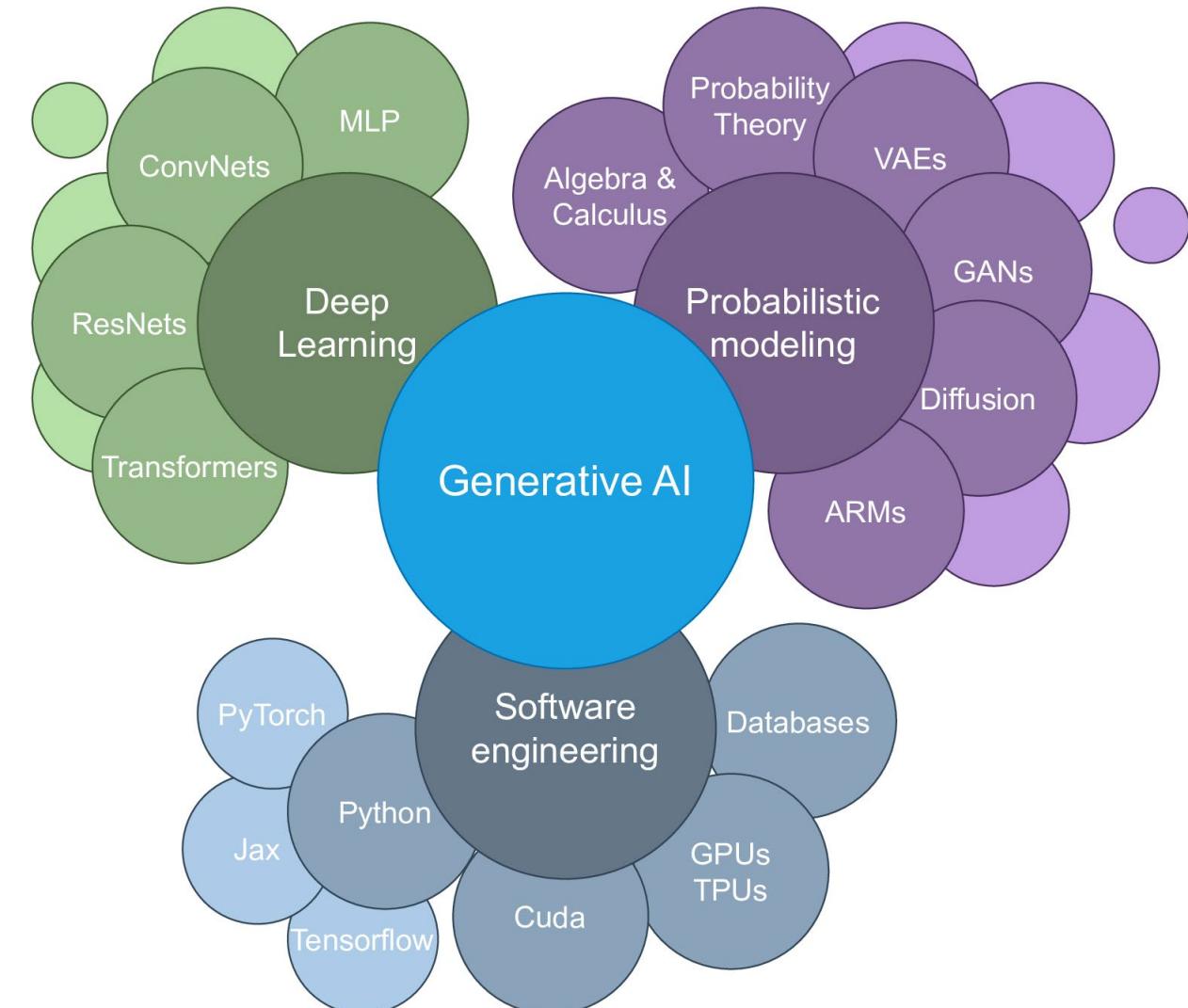
(principles of building models)

**Deep Learning**

(parameterizations of distributions)

**Software engineering**

(effective and efficient  
implementation of Generative AI)



# The first comprehensive book on Generative AI

Theory and code for GenAI:

Autoregressive models

Flow-based models

Variational Auto-Encoders

Diffusion models

Generative Adversarial Networks

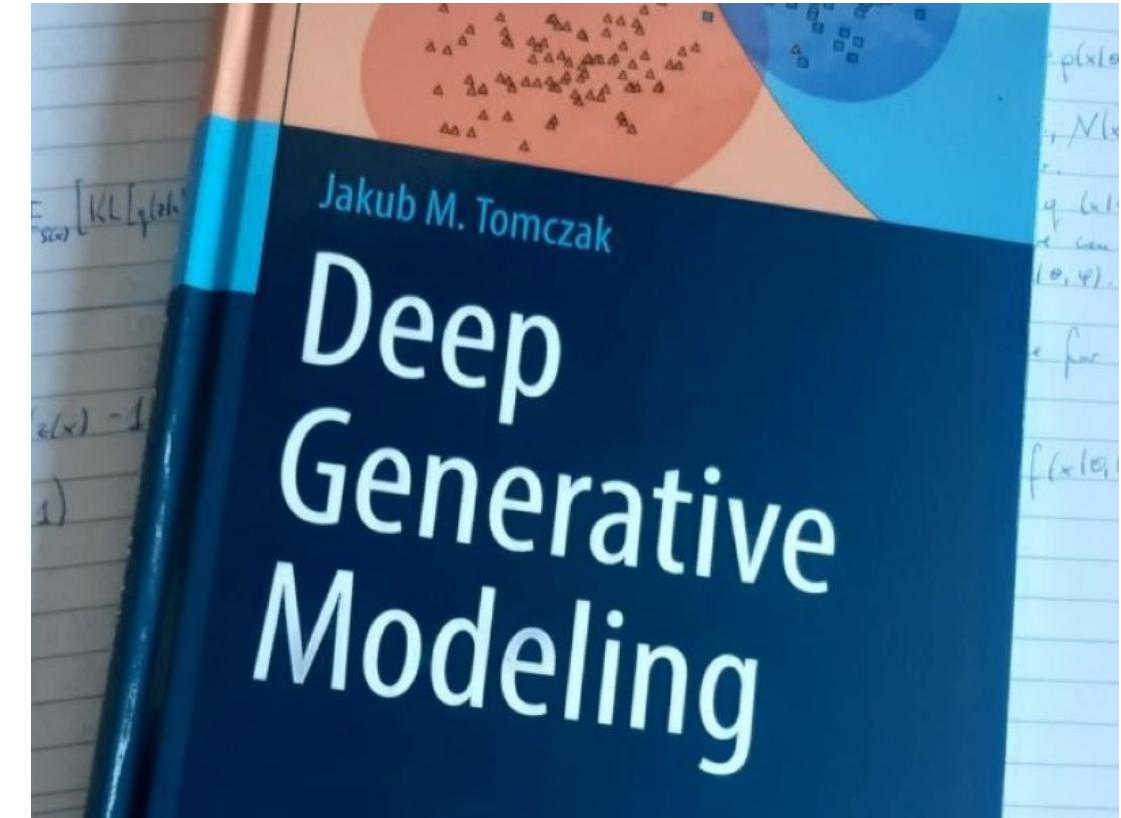
Energy-based models

**(new edition: under development)**

Score-based Models

LLMs with Transformers

Generative AI Systems



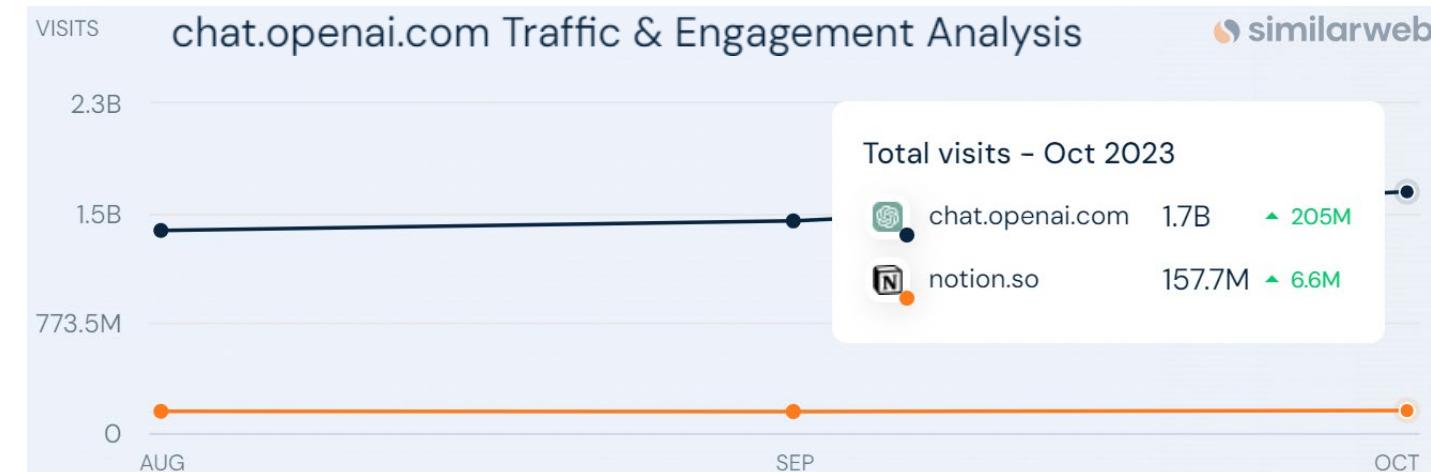
Tomczak, J. M. (2022). *Deep Generative Modeling*. Springer Cham

# What can we do with Generative AI?



## OpenAI Chat GPT

Launched November 30, 2022



## Exclusive: OpenAI explores how to get ChatGPT into classrooms

By Anna Tong

November 16, 2023 8:47 PM GMT+1 · Updated 13 hours ago



01/08/24 | Wolfsburg | Models | Press Release

## World premiere at CES: Volkswagen integrates ChatGPT into its vehicles

The Washington Post

## These lawyers used ChatGPT to save time. They got fired and fined.

Artificial intelligence is changing how law is practiced, but not always for the better

By Pranshu Verma and Will Oremus

Updated November 16, 2023 at 10:39 a.m. EST | Published November 16, 2023 at 6:00 a.m. EST

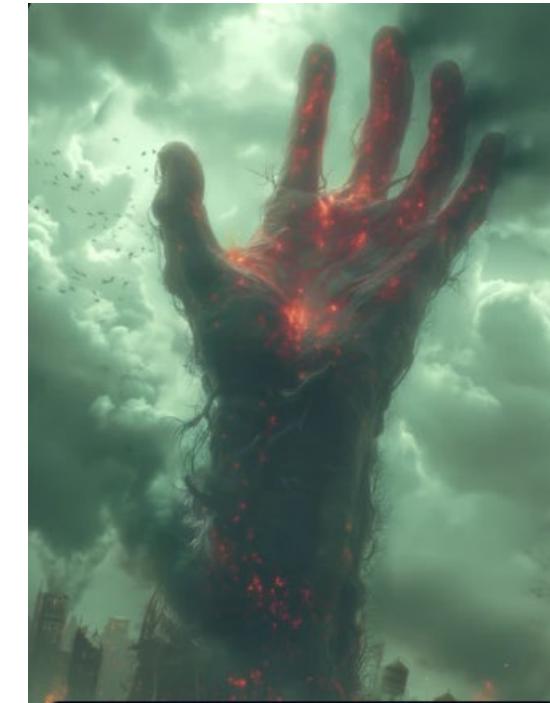




/v6\_upscale 9 hrs ago  
Honeybee  
vlad\_designtrip ...



/v6\_upscale 10 hrs ago  
a young asian girl, Cute dark style,in the style of he jiaying,Full-body photo,dark white and dark...  
nicklinjoule ...



/upscale 11 hrs ago  
Big hand-monster under the town, Post apocalyptic, future  
orxan411 ...



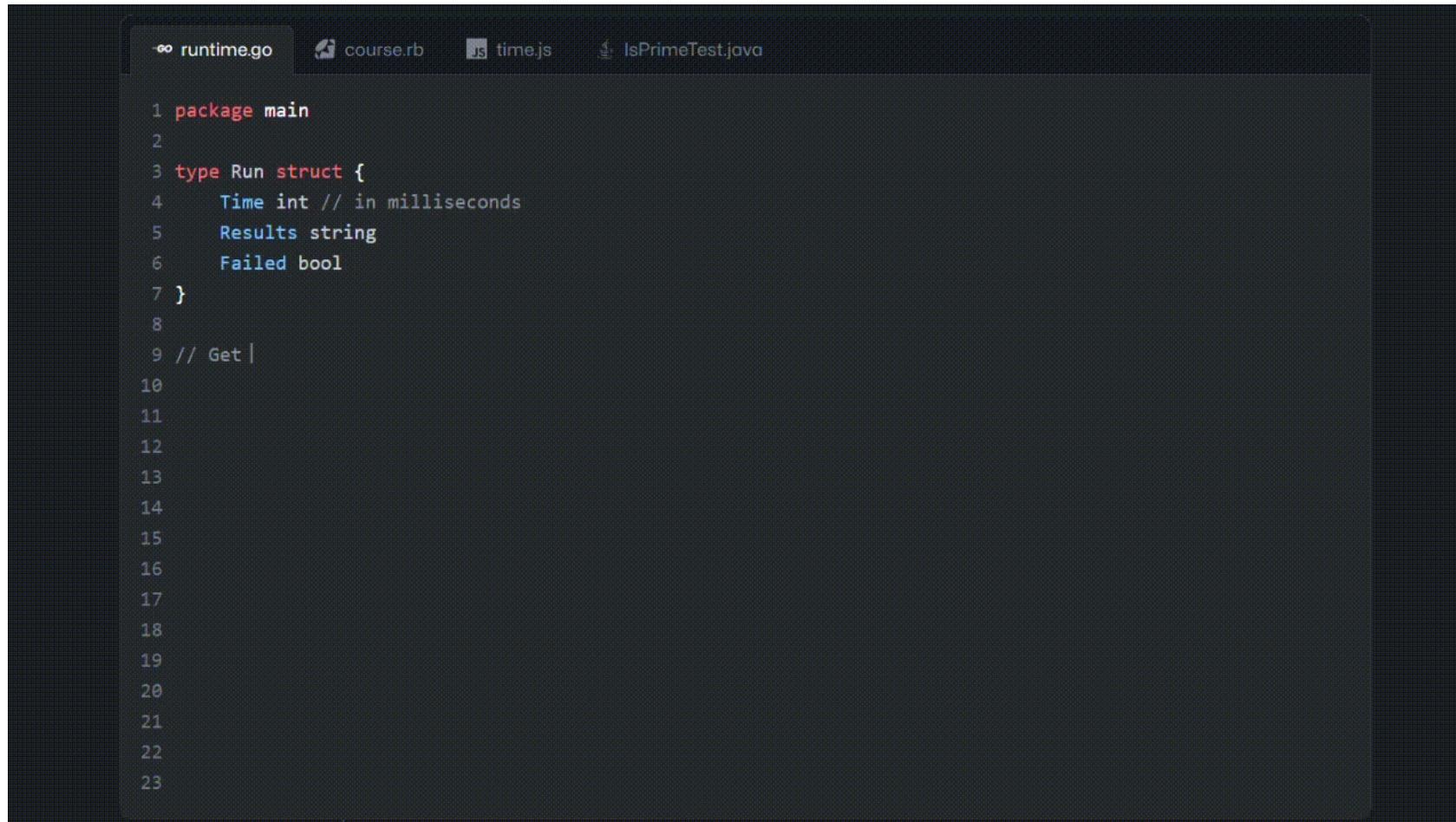
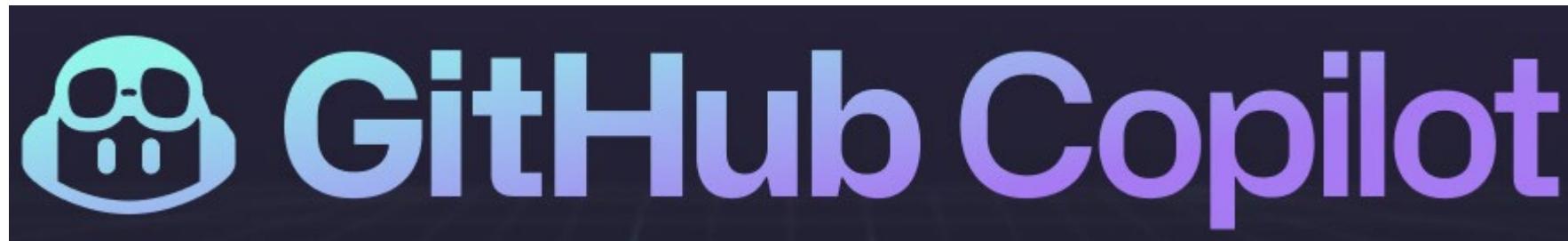
/v6\_upscale 24 hrs ago  
futuristic city with sleek, lumbering robots the size of skyscrapers walking around, 4k uhd, imposing...  
monsterlegendslore ...



Skeleton man going on an adventure in the foggy hills of Ireland wearing a cape



Portrait photo of an anthropomorphic farmer cat holding a shovel in a garden...

A screenshot of a code editor showing the "runtime.go" file. The file contains the following Go code:

```
1 package main
2
3 type Run struct {
4     Time int // in milliseconds
5     Results string
6     Failed bool
7 }
8
9 // Get |
10
11
12
13
14
15
16
17
18
19
20
21
22
23
```

The code editor interface shows other files like "course.rb", "time.js", and "IsPrimeTest.java" in the background.



# Google DeepMind

**Prompt**

Here's a solution to a Physics problem by a student.

23. A skier slides down the frictionless slope as shown. What is the skier's speed at the bottom?

Solution:

The conservation of energy means that the energy of the skier is same at the beginning and at the end.

Start:  $E = mgL$

End:  $E = \frac{1}{2}mv^2$

$$\Rightarrow mgL = \frac{1}{2}mv^2$$

$$\Rightarrow v = \sqrt{2gL} = \sqrt{2 \times 9.81 \times 80} = 39.6 \text{ m/s}$$

Try to reason about the question step by step.

Did the student get the correct answer? If the solution is wrong, please explain what is wrong and solve the problem.

Make sure to use LaTeX for math and round off the final answer to two decimal places.

**Response**

The student did not get the correct answer. The student made a mistake in the calculation of the potential energy at the start of the slope. The potential energy at the start of the slope is given by  $mgh$ , where  $m$  is the mass of the skier,  $g$  is the acceleration due to gravity, and  $h$  is the height of the slope. The student used the length of the slope,  $L$ , instead of the height,  $H$ , in the calculation of the potential energy.

The correct solution is:

The conservation of energy means that the total energy of the skier is the same at the beginning and at the end of the slope.

At the start of the slope, the skier has only potential energy, which is given by  $mgh$ .

At the end of the slope, the skier has only kinetic energy, which is given by  $\frac{1}{2}mv^2$ .

Therefore, we can write:

$$mgh = \frac{1}{2}mv^2$$

Cancelling out the mass  $m$  on both sides, we get:

$$gh = \frac{1}{2}v^2$$

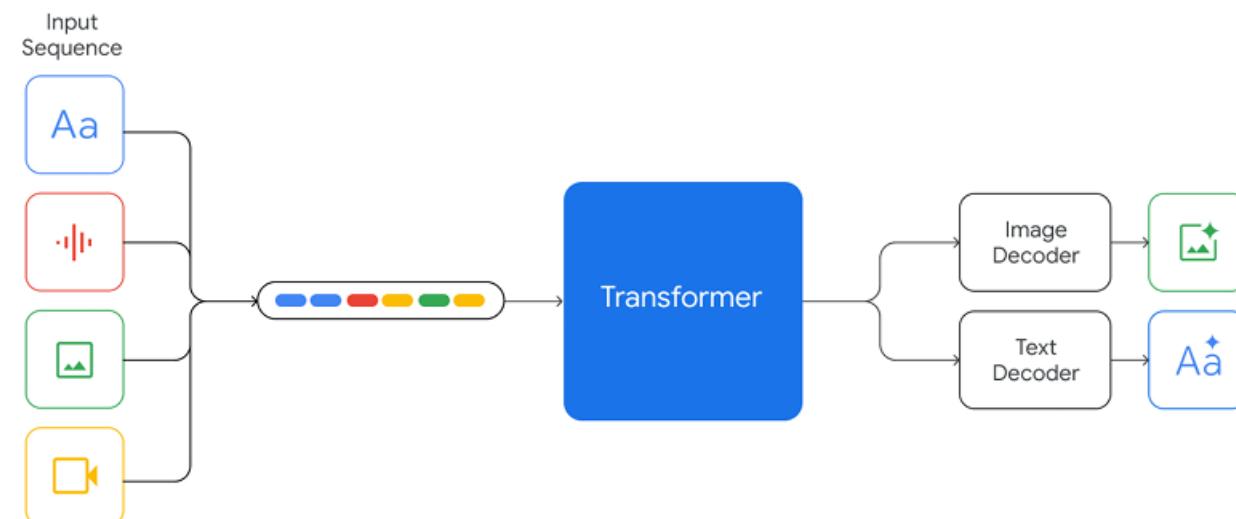
Solving for  $v$ , we get:

$$v = \sqrt{2gh}$$

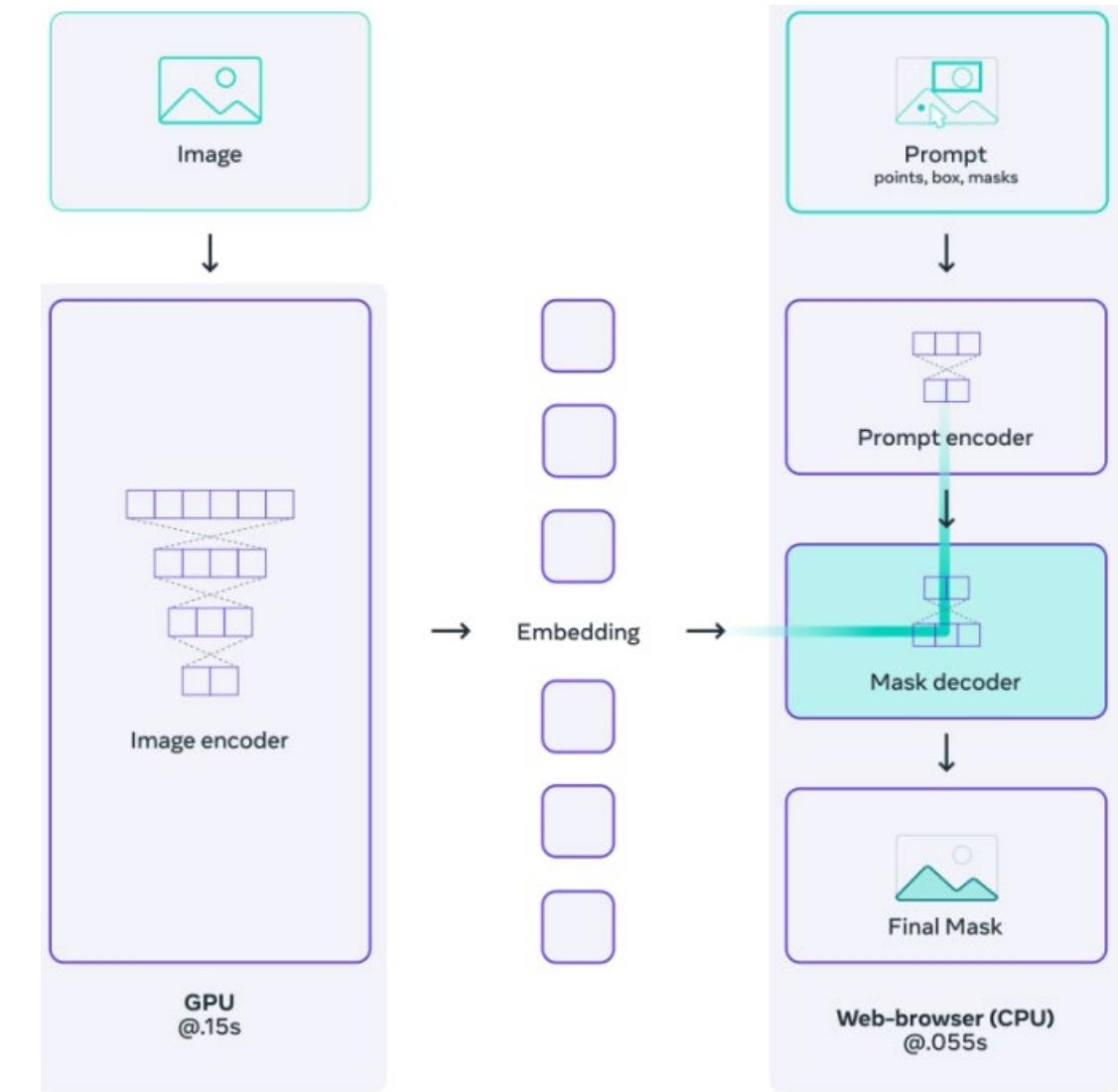
Substituting the given values, we get:

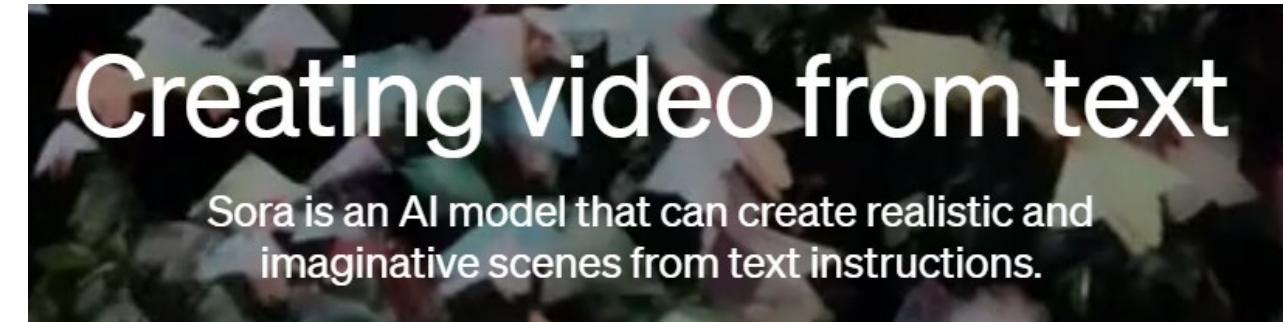
$$v = \sqrt{2 \times 9.81 \times 40} = 28.01 \text{ m/s}$$

Therefore, the skier's speed at the bottom of the slope is 28.01 m/s.



# ∞ Meta



 OpenAI  
Sora

Prompt: Photorealistic closeup video of two pirate ships battling each other as they sail inside a cup of coffee.

# **The future of Generative AI: The key to Industry 5.0**

# Enterprise applications and use cases for GenAI



## Consumer goods and retail

- Providing virtual fitting rooms
- Scheduling delivery and installation
- Providing in-store product-finding assistance
- Optimizing demand prediction and inventory planning
- Generating novel product designs



## Manufacturing

- Serving as expert copilot for technicians
- Allowing conversational interactions with machines
- Providing prescriptive and proactive field service
- Enabling natural language troubleshooting
- Assessing warranty status and documentation
- Understanding process bottlenecks and devising recovery strategies



## Media and entertainment

- Providing intelligent search and tailored content discovery
- Writing engaging headlines and copy
- Providing real-time feedback on content quality
- Curating personalized playlists, news digests, and recommendations
- Enabling interactive storytelling, driven by viewer choices
- Delivering targeted offers and subscription plans



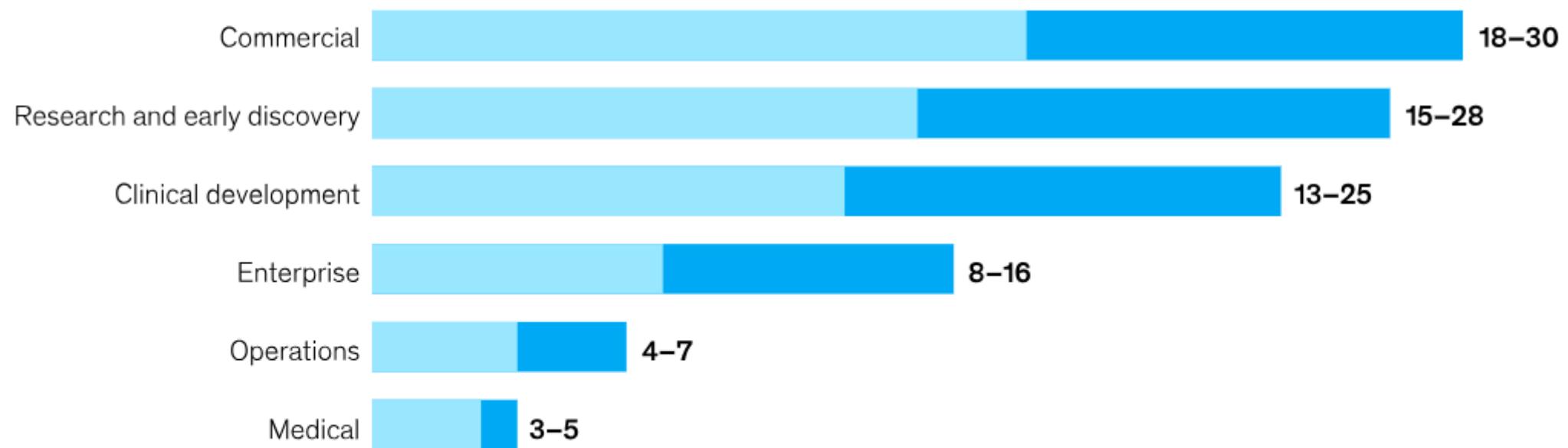
## Financial services

- Uncovering potential trading signals and alerting traders to vulnerable positions
- Accelerating underwriting decisions
- Optimizing and rebuilding legacy systems
- Reverse-engineering banking and insurance models
- Monitoring for potential financial crimes and fraud
- Automating data gathering for regulatory compliance
- Extracting insights from corporate disclosures

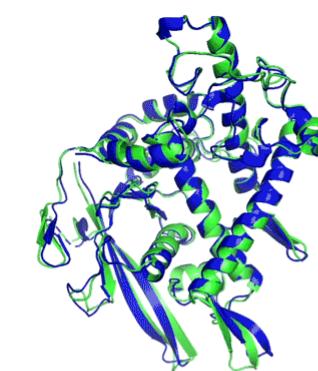
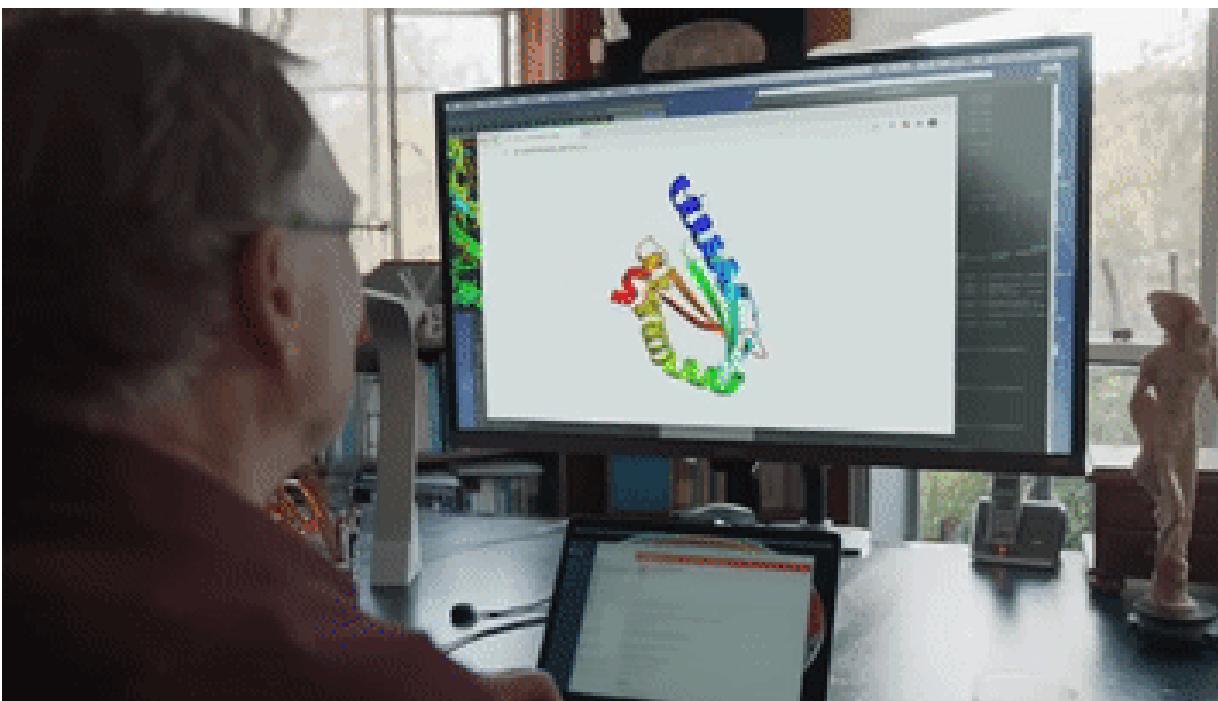
# Generative AI in the pharmaceutical industry

Generative AI is expected to produce \$60 billion to \$110 billion in annual value across the pharmaceutical industry value chain.

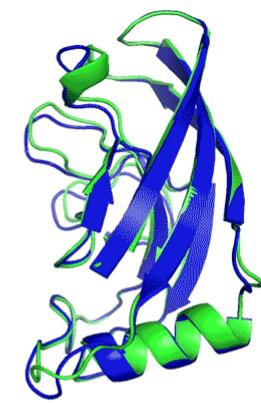
Expected value annually, \$ billion



Source: McKinsey analysis



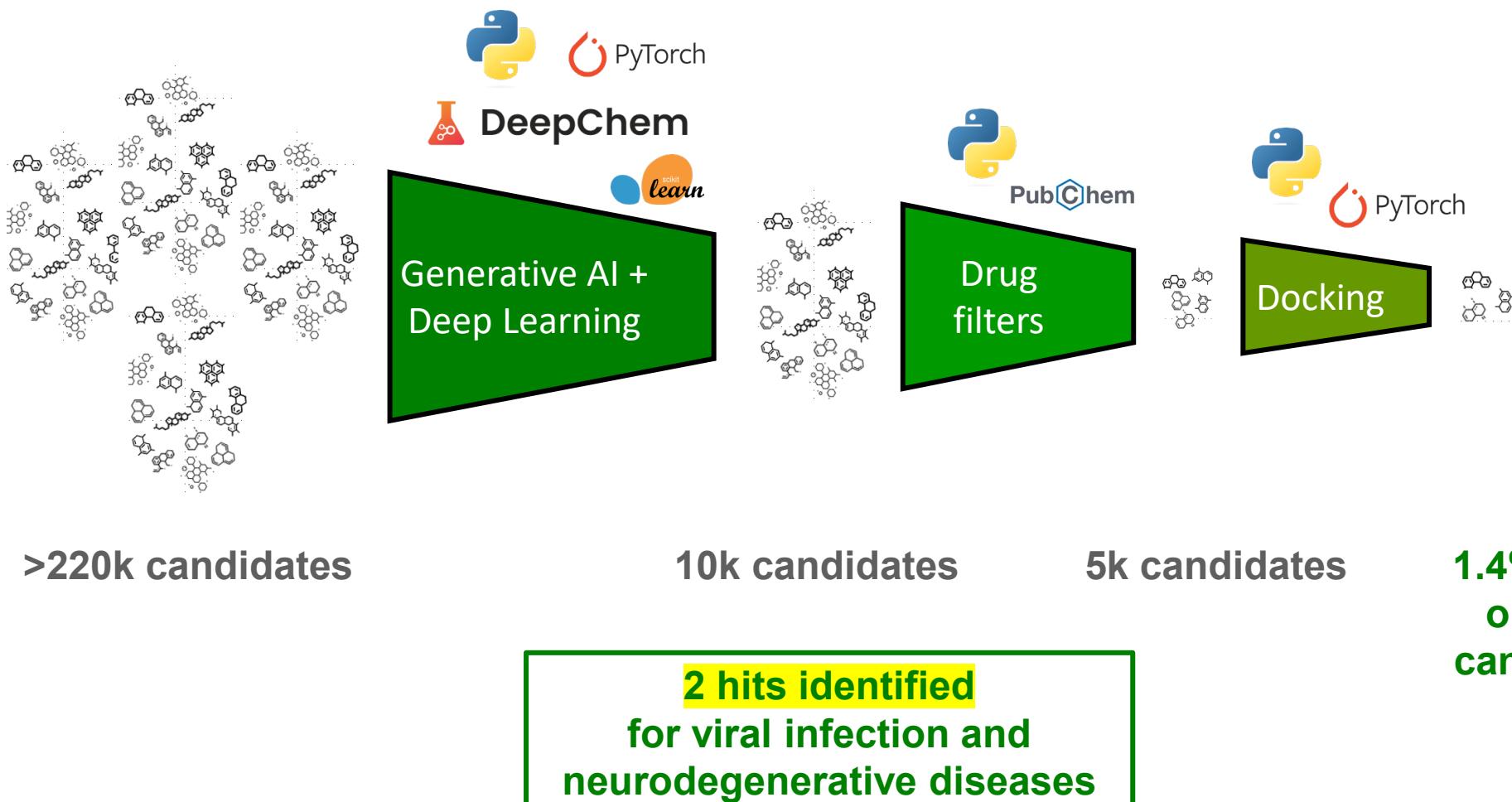
T1037 / 6vr4  
90.7 GDT  
(RNA polymerase domain)



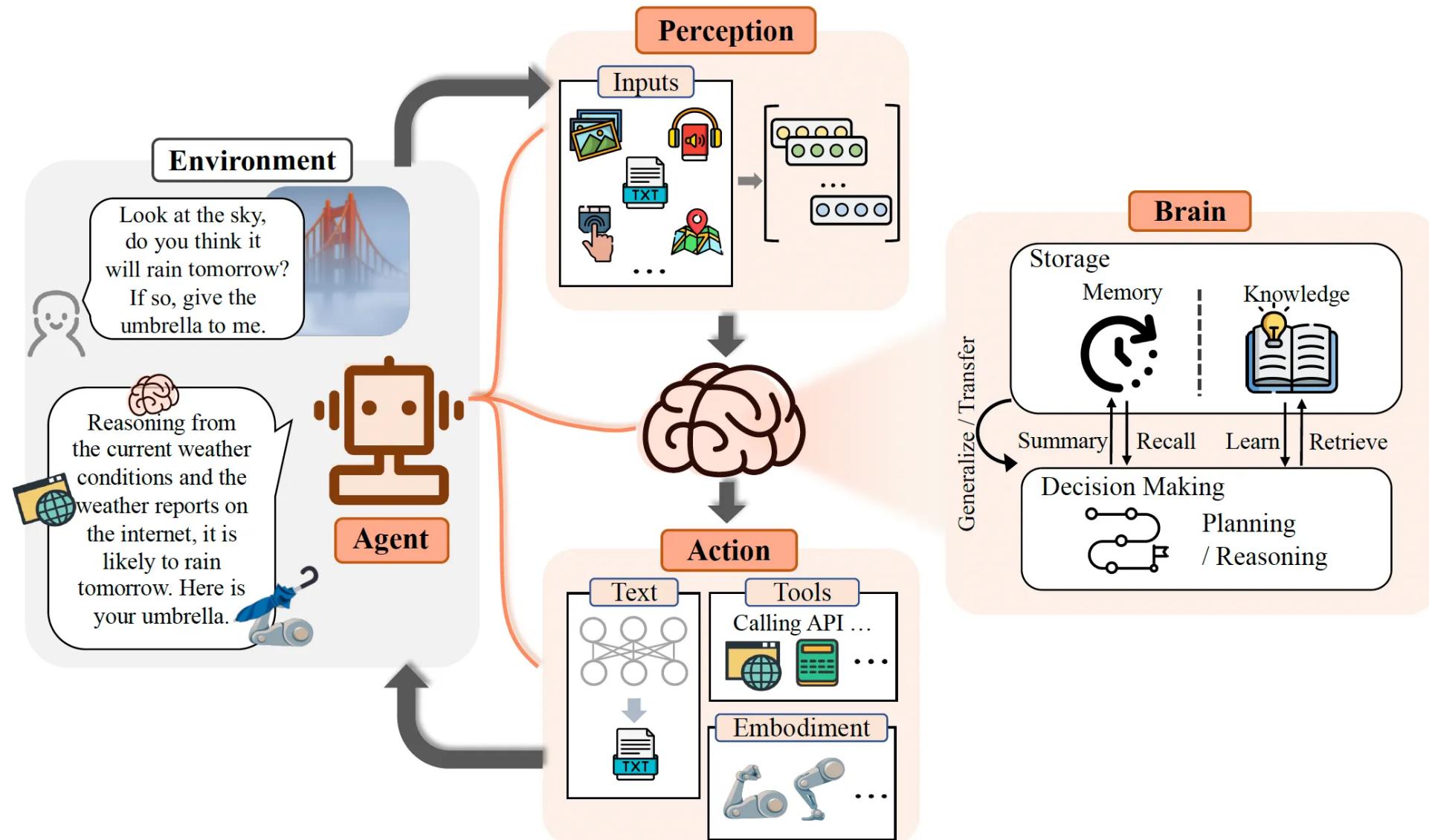
T1049 / 6y4f  
93.3 GDT  
(adhesin tip)

- Experimental result
- Computational prediction

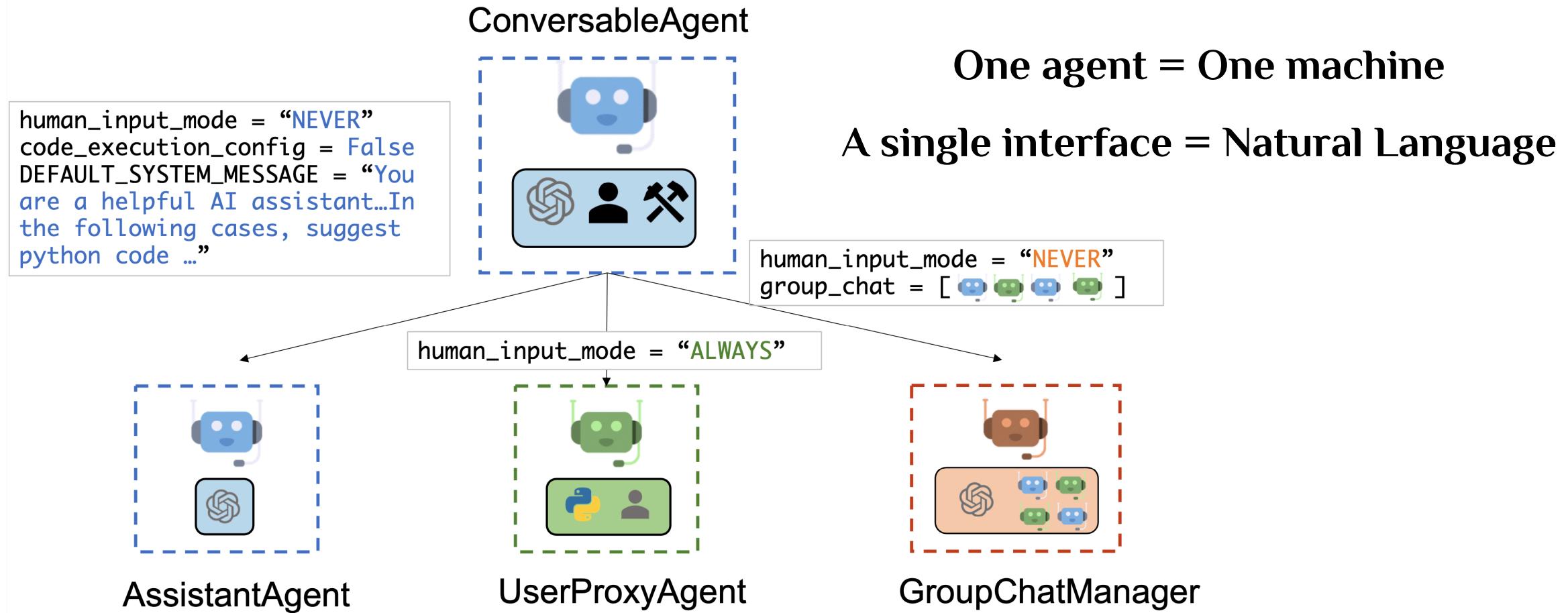
# Generative AI for drug discovery



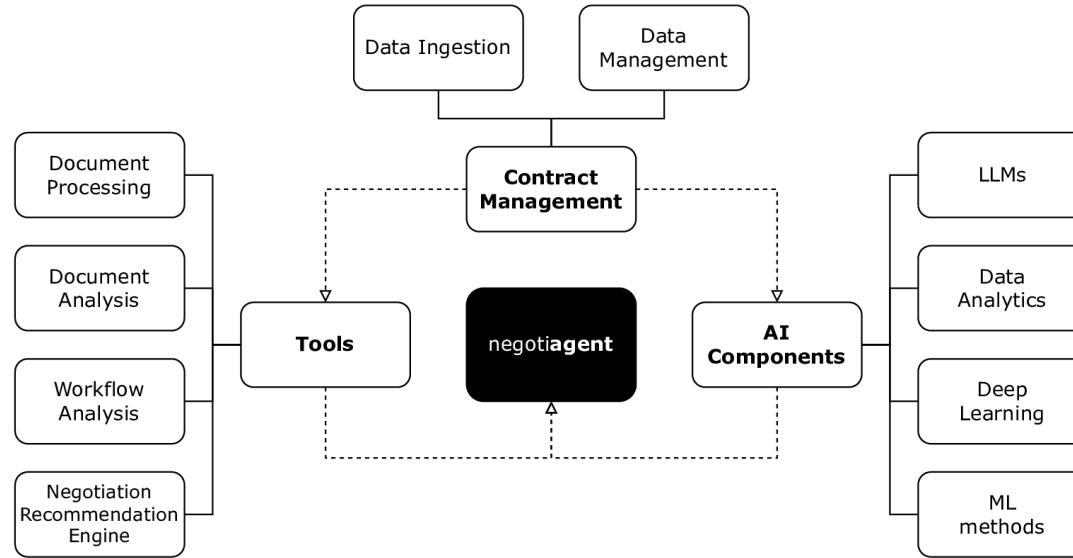
# Multimodal agents



# Distributed Generative Multi-Agent Systems



# Contract negotiating agents



**Contract Intelligence**

The screenshot shows a Microsoft Word document titled "sample\_contract\_anon\_0014 2". The ribbon is visible at the top, showing the "Start" tab is selected. A large blue box highlights the "Co-Pilot & Auto-Pilot" feature. Below the ribbon, the document content is visible, including the heading "Acme Corp. CONTRACT GENERAL TERMS AND CONDITIONS" and several numbered clauses. The right side of the screen shows the Microsoft 365 ribbon and some additional toolbars.

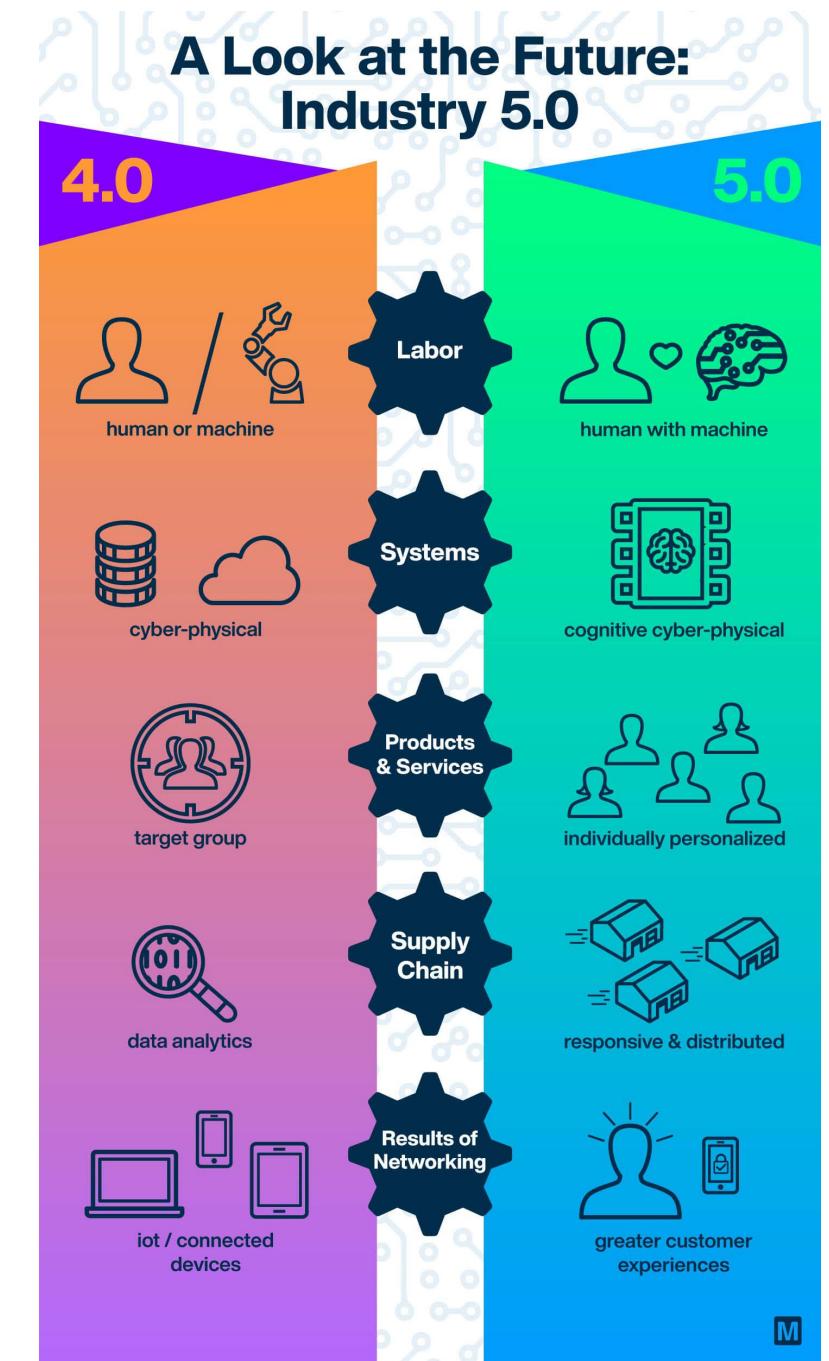
# Conclusion

# Generative AI is the key!

## Generative AI + Decision Making

Generative AI helps...

- programmers
- engineers
- machines to talk
- lawyers
- drug designers
- ...



# Thank you!

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[jmk.tomczak@gmail.com](mailto:jmk.tomczak@gmail.com)

## Generativ/e

Generative AI Group: <https://generativeai-tue.github.io/>

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