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Artificial Intelligence: A Practical Primer

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AI has been around for 70 years



Artificial Intelligence, the science and engineering of making intelligent machines



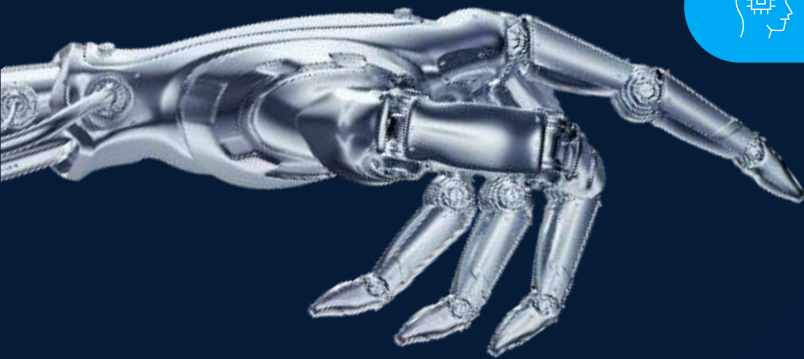
Machine Learning, a major approach to realize AI



Deep Learning



Generative AI



1950's

1960's

1970's

1980's

1990's

2000's

2010's

2020's

Artificial Intelligence

Is the broad field of developing machines that can replicate human behavior, including all aspects of **perceiving, reasoning, learning, and problem solving**

Machine Learning

Is a major approach to **achieve AI by teaching machines to learn relationships hidden in data, and build approximate models of real systems**

Deep Learning

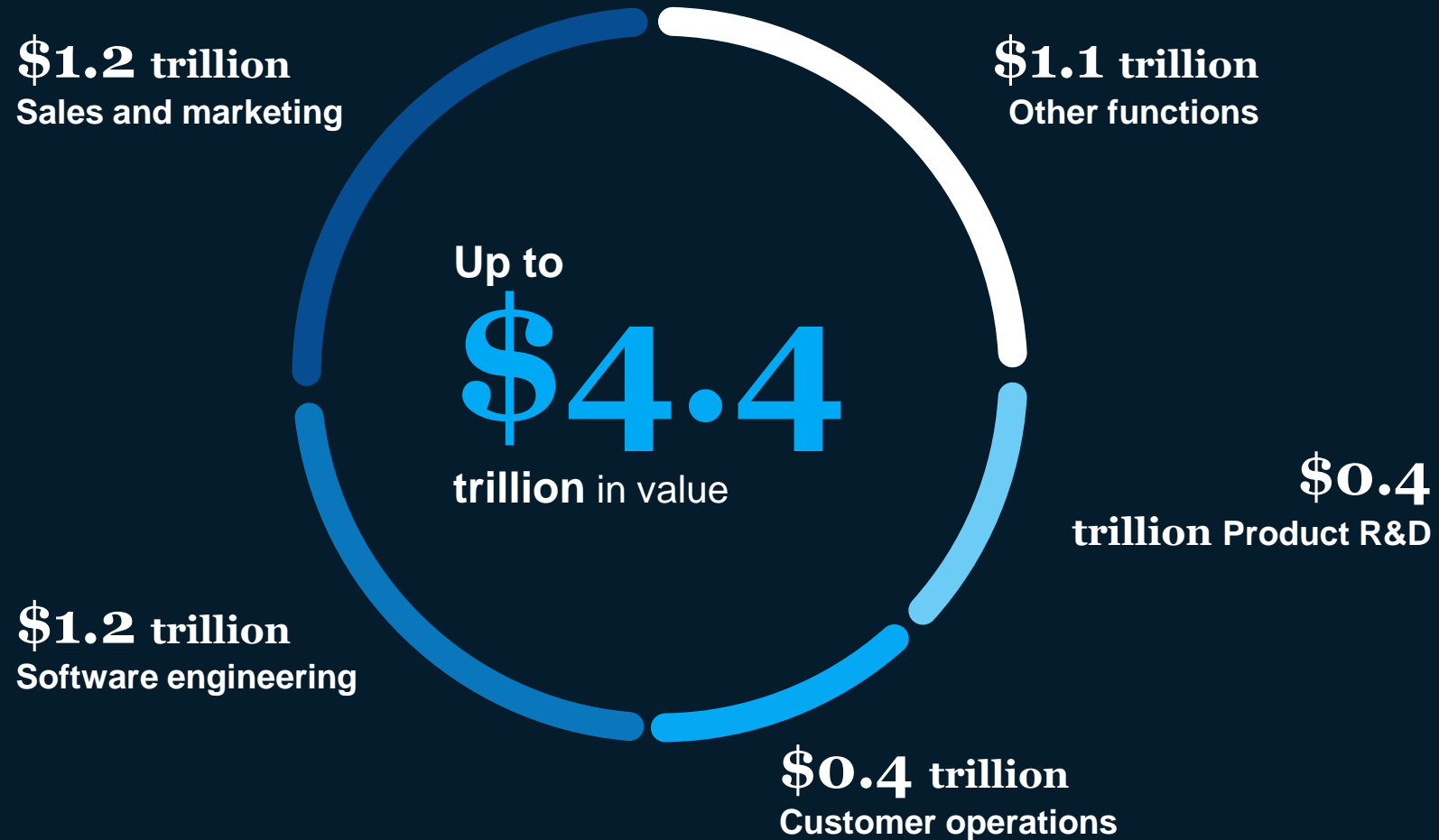
is a **branch of Machine Learning** that uses 'neural networks' to **model real systems** by mimicking how the human brain works, utilizing millions of computational 'neurons'

Generative AI

are a **branch of Deep Learning** that uses exceptionally large neural nets called **Large Language Models** (with 100's of billions of neurons) that can learn especially abstract patterns

Applying these language models to interpret and create text, images, video, and data has become known as **Generative AI**

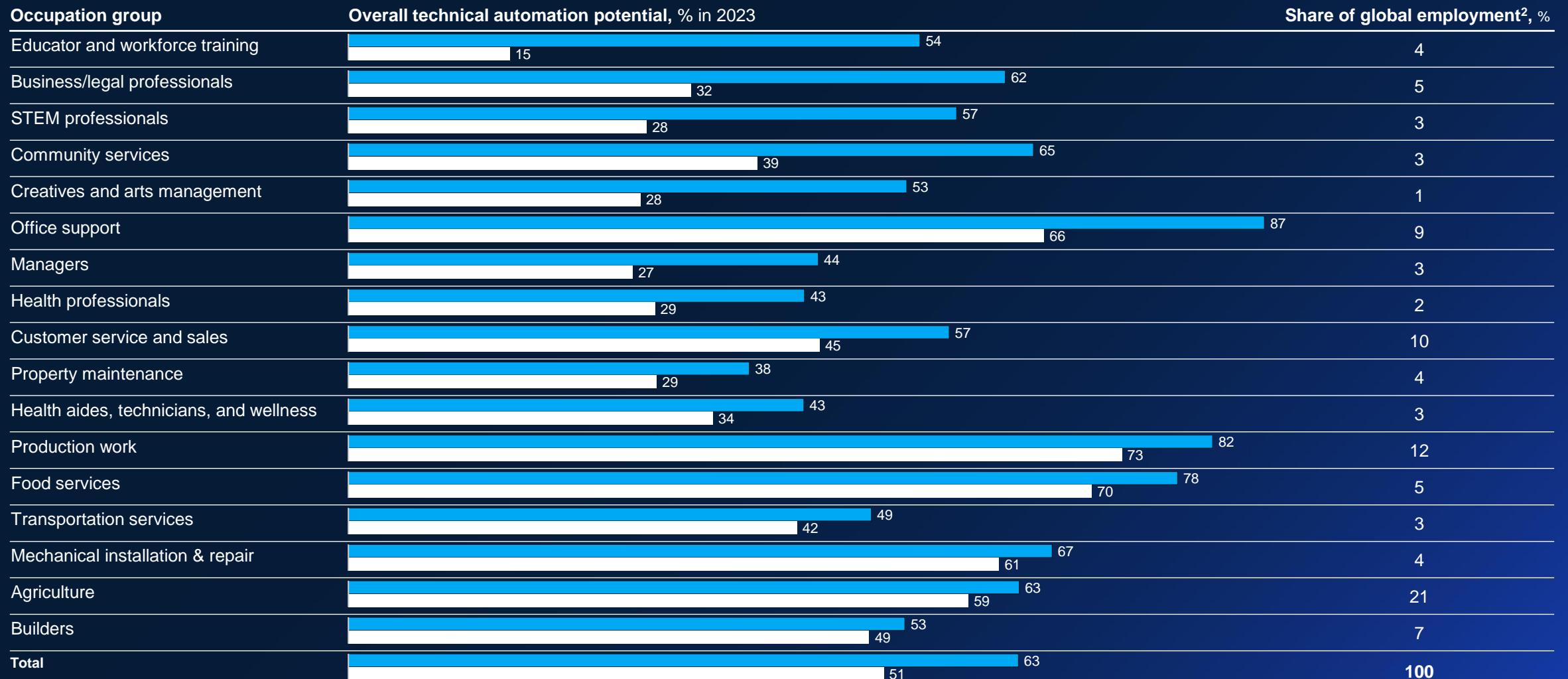
Generative AI is poised to boost performance and unlock **trillions** of dollars across functions



Advances in technical capabilities could have the most impact on activities performed by educators, professionals, and creatives

Impact of generative AI on technical automation potential in midpoint scenario, 2023

■ With generative AI ■ Without generative AI¹



Note: Figures may not sum, because of rounding.

1. Previous assessment of work automation before the rise of generative AI.

2. Includes data from 47 countries, representing around 80% of employment across the world.

Source: "The economic potential of generative AI: The next productivity frontier", McKinsey Global Institute, June 2023.

We see 4 leading uses of AI

Archetype

Content Synthesis



Coding & Software



Content generation



Customer Engagement



Description

Generate insights and drive actions based on summarization and synthesis of unstructured data

Interpret and generate code and documentation

Support ideation for new product development or generate personalized marketing copy

Streamline interactions by interpreting text or model customer journeys

Selected use cases

Extract insights from large document sets (e.g., ESG information from sustainability reports)
Augment capabilities of operations staff (e.g., chat interface for maintenance operator)

Generate code and assist developers
Refactor or translate code to accelerate mainframe migration

Personalized customer comms or marketing
Generate RfPs or technical documents
Generate visuals (images, designs, 3D models) to accelerate the product design process

Streamline customer communications, e.g., issue resolution (driving action to resolve) and Q&A
Model and predict elements in patient or customer journey

Examples

Technical report query



1. Perform regular maintenance. Contact a work order request and assign the technician based on equipment type and location. (Source: page 11)
2. Check the conditions. Insure the tires to the correct pressure and check for the chain for correct pressure. Refer to the Operation and Maintenance Manual for information on the chains and the information. (Source: page 11)
3. Avoid operating the machine in conditions that can lead to tipping or damage. This includes carrying a full load, carrying or towing a load, riding, or other unsafe practices for all operators. (Source: page 11)
4. Use proper flow. Ensure the flow being used are appropriate for the machine by checking with your local dealer. Adjust the flow as a type can lead to reduced performance. (Source: page 11)
5. Consider the machine safety. Avoid operating the machine across slopes, and when possible, operate the machine up and down the slope. Consider safety of the machine and do not exceed the capacity. (Source: page 11)

Code optimization

```

COMPUTE GROSS PAY
IF HOURS_WORKED > 40 THEN
  MULTIPLE_PAY_RATE BY 1.5, EXCESS OVERTIME_RATE
ELSE
  MULTIPLE_PAY_RATE BY 1.0, OVERTIME_RATE
SUBTRACT 40 FROM HOURS_WORKED TO GET OVERTIME_HOURS
MULTIPLE_HOURS_BY_PAY_RATE TO GET GROSS_PAY
MULTIPLE_OVERTIME_HOURS_BY_OVERTIME_RATE
GROSS_PAY + OVERTIME_PAY
END COMPUTE GROSS_PAY

```



```

def compute_gross_pay(timecard):
    if timecard.hours_worked > 40:
        overtime_rate = timecard.pay_rate * 1.5
        regular_hours = 40
        overtime_hours = timecard.hours_worked - 40
        regular_pay = regular_hours * timecard.pay_rate
        overtime_pay = overtime_hours * overtime_rate
        gross_pay = regular_pay + overtime_pay
    else:
        gross_pay = timecard.hours_worked * timecard.pay_rate
    return gross_pay

```

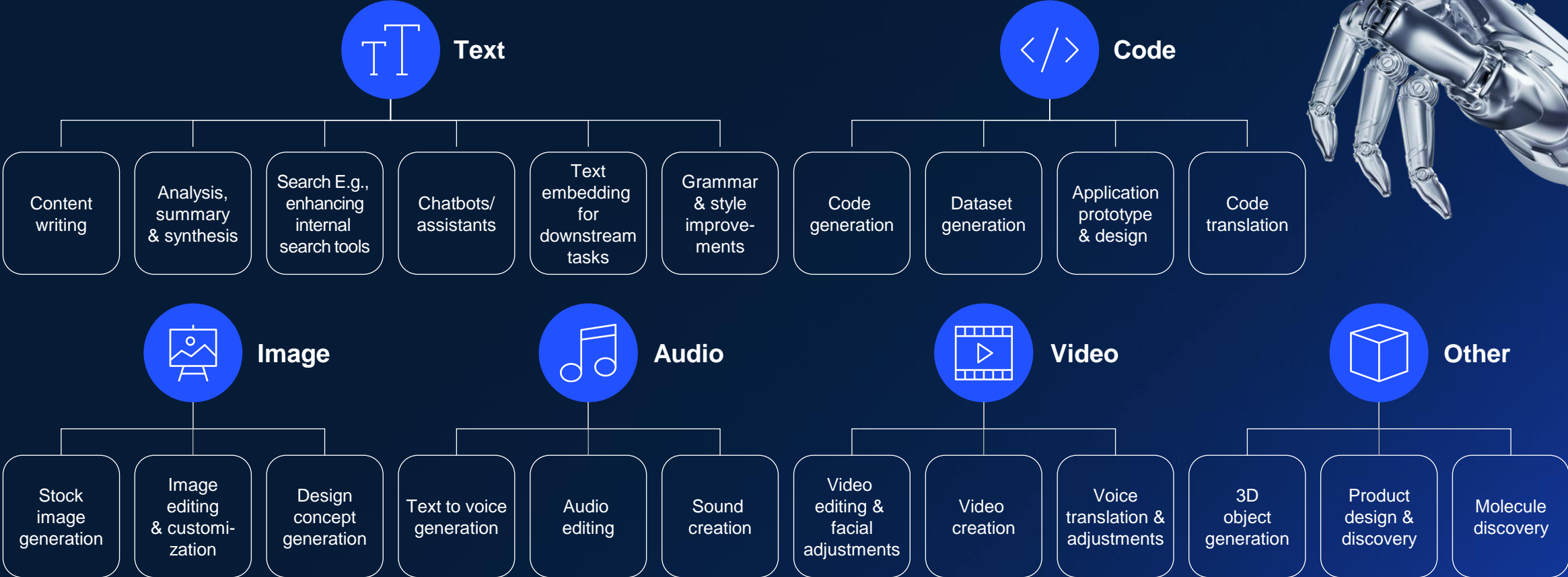
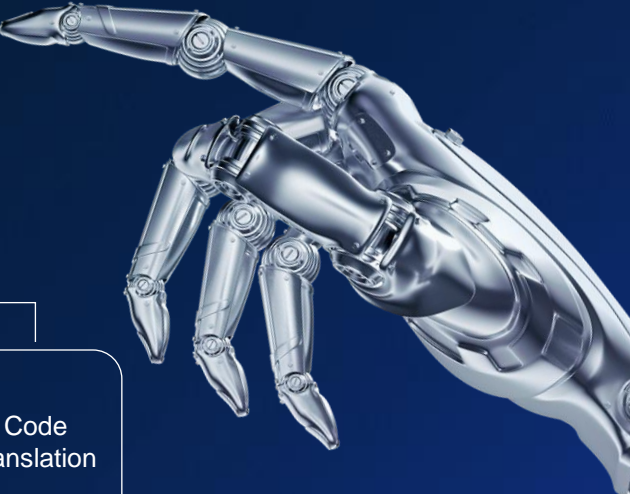
Design ideation



Always on chat bot



The world of Generative AI is far broader than ChatGPT and large language models, and has many applications



AI's impact on organizations will be faster, broader and deeper

Continuation..



Automation and digitization reshaping Future of Work and Future of Workforce



Demographic shifts changing structure of workforces and talent pools



Employees placing increased demands on their (potential) employers



...and exacerbation of talent challenges and opportunities



Faster

The pace of workforce transformation is likely to accelerate

10 year

acceleration of widespread automation compared to pre-GenAI



Broader

GenAI will reshape the way we work impacting all employees, incl. occupations with higher levels of education

70%

of jobs significantly exposed to automation due to GenAI – with some professions 2X compared to pre GenAI



Deeper

GenAI has the potential to change the anatomy of work, augmenting individual tasks for all employees

25%

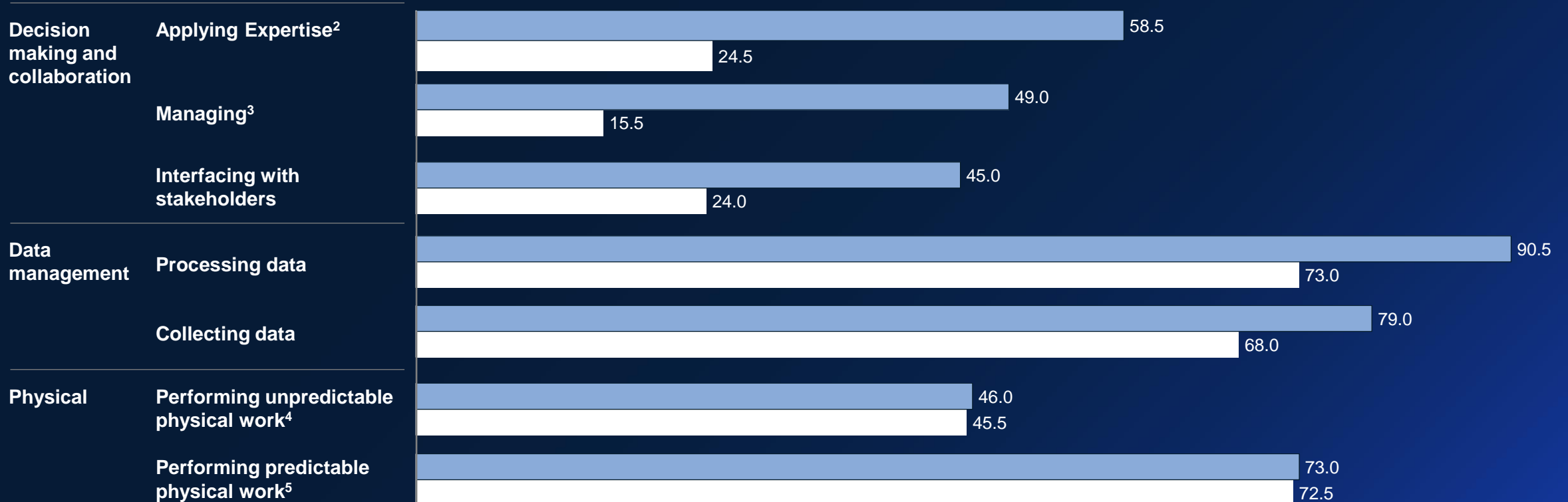
of employees' time previously not automatable, is now potentially automatable by AI

The growth of GenAI could have the biggest impact on collaboration and the application of expertise, activities that previously had a lower potential for automation

Overall technical automation potential, comparison in midpoint scenarios, % in 2023

■ With generative AI ■ Without generative AI¹

Activity groups



Note: Figures may not sum, because of rounding

1. Previous assessment of work automation before the rise of generative AI. 2. Applying expertise to decision making, planning, and creative tasks.

3. Managing and developing people. 4. Performing physical activities and operating machinery in unpredictable environments.

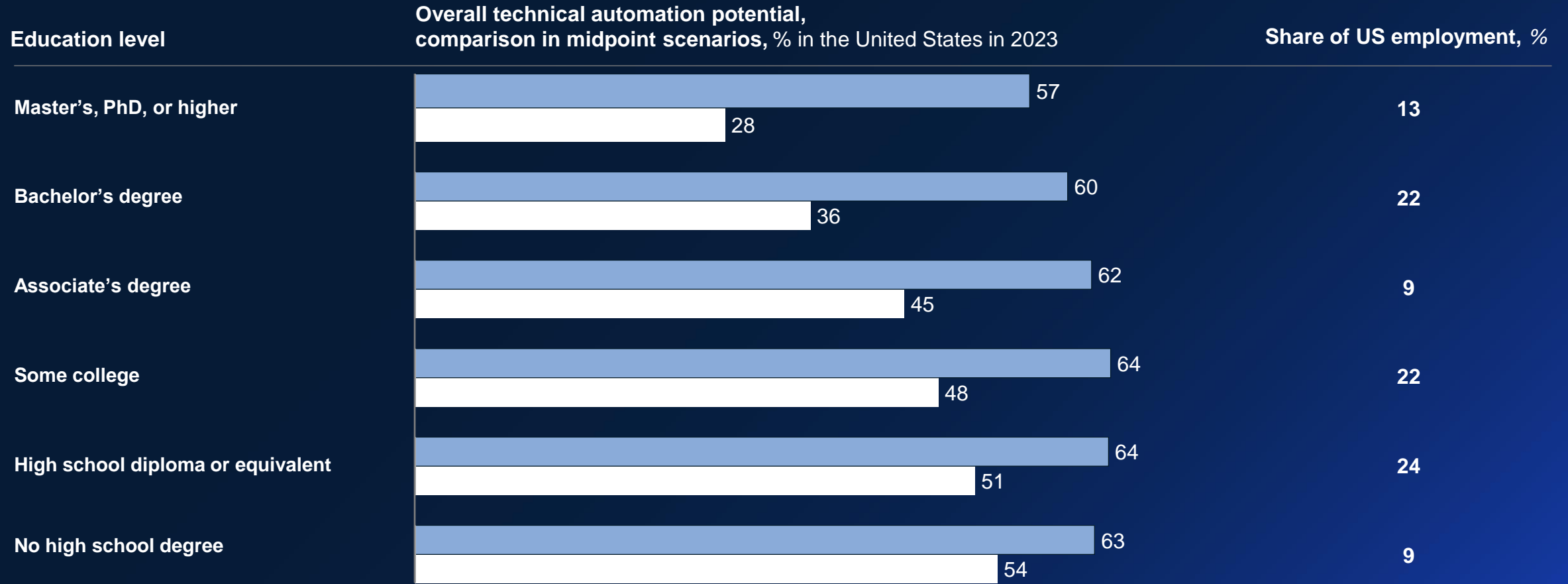
5. Performing physical activities and operating machinery in predictable environments.

Source: McKinsey Global Institute analysis

Generative AI increases the potential for technical automation most in occupations requiring high levels of educational attainment.

Impact of generative AI on technical automation potential in midpoint scenario, 2023

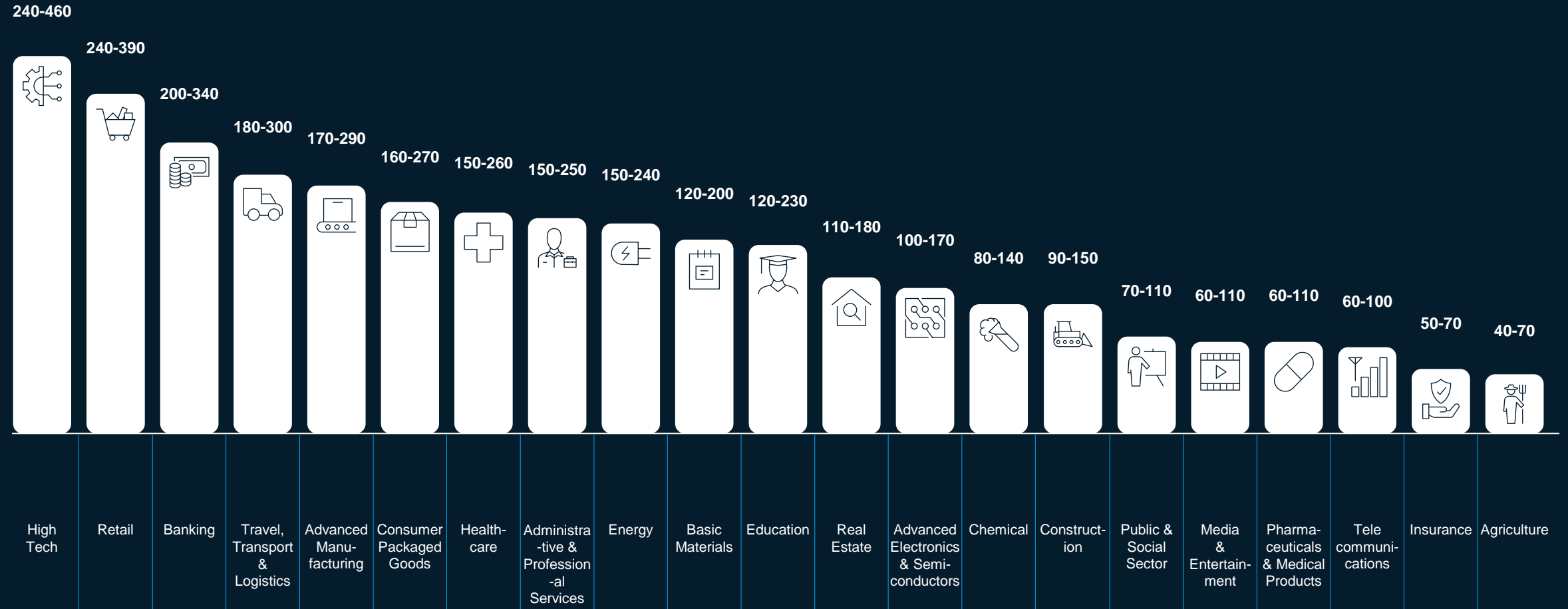
■ With generative AI ■ Without generative AI¹



1. Previous assessment of work automation before the rise of generative AI.

Generative AI will have a significant impact across all industry sectors

Generative AI productivity impact by sector (Total, \$ billion)



But contrary to mainstream opinion, generative AI is not yet the answer in every situation



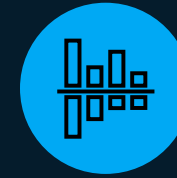
High-stakes scenarios where errors, factual inaccuracies, or value judgements can cause harm

Disease diagnostic



Applications involving **heavy volume** of requests and/or tight response **time limits**

High frequency stock trading



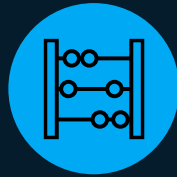
Unconstrained, long, open-ended generation that may expose **harmful or biased content** to users

Legal document creation



Applications requiring **explainability** and/or full understanding of potential failure modes (e.g., highly regulated environments)

Credit scoring



Applications requiring **numerical reasoning** (from basic arithmetic to optimization)

Demand Forecasting

Artificial Intelligence and the Future of Work

1

Do you think AI will create more jobs than it eliminates?

2

What types of jobs do you think are most at risk due to AI?

- Manual Labor, Data Entry, Customer Service, Creative Professions, Management

3

Do you think that AI could ever fully perform your job?

4

Which sector do you think will be most positively transformed by AI?

- Healthcare, Transportation, Manufacturing, Entertainment, Education

5

Should there be ethical guidelines for the use of AI in hiring?