

Artificial intelligence

Sizing and seizing the investment opportunity

GWM Chief Investment Office

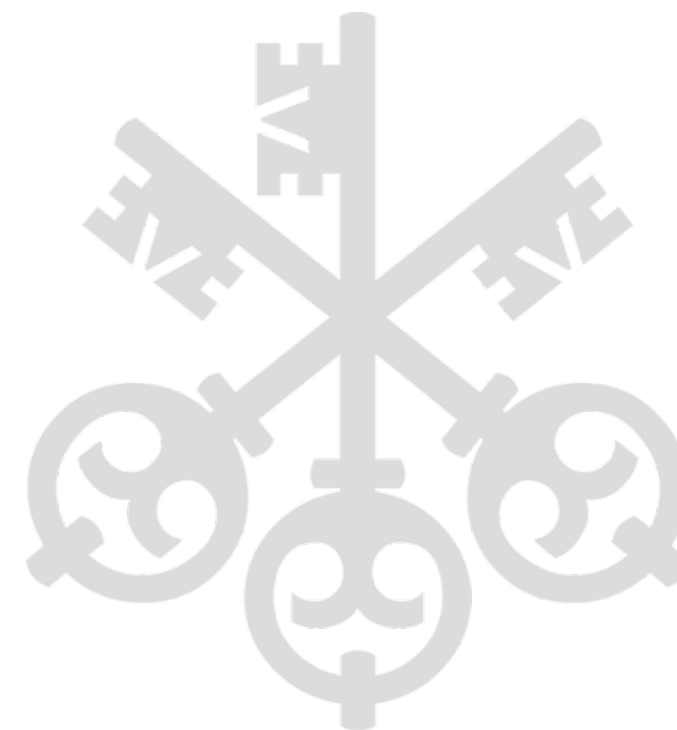
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29 August 2024

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UBS CIO AI Views

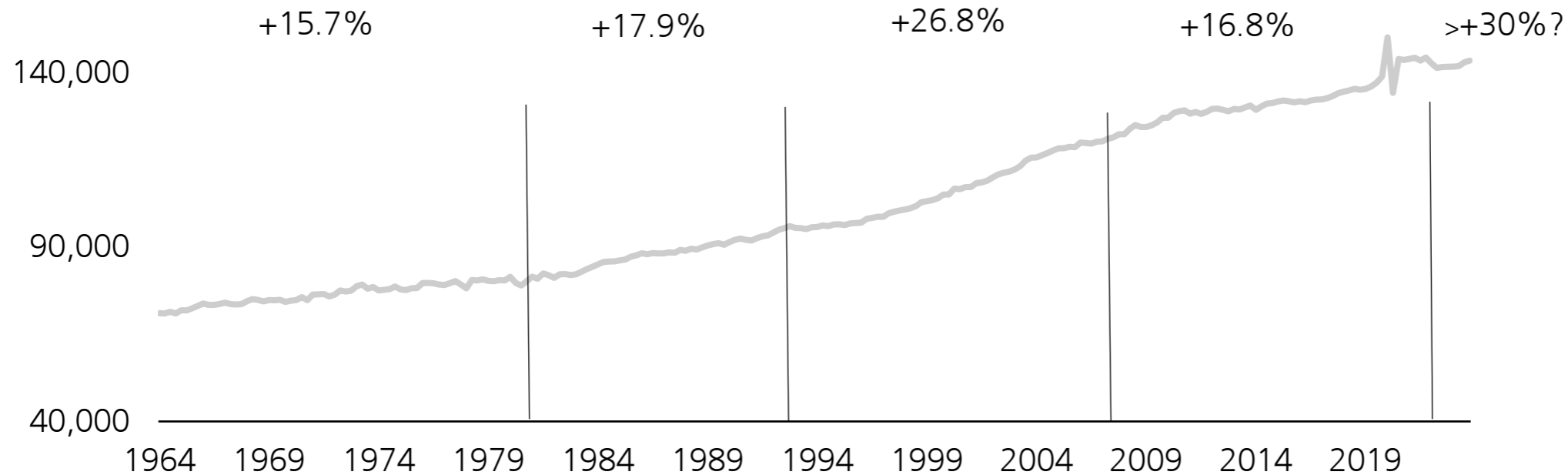
- 1 AI will be the **most profound innovation** and one of the **largest investment opportunities** in human history
- 2 The **ratio of monetization potential** of the AI application layer to the costs of the enabling and intelligence layers will become a key metric for investment returns
- 3 AI will kick off a **data center capex cycle** that will dwarf general purpose data center capex in the next years
- 4 The AI silicon moment: **AI chips** will capture a **large part of the AI value creation**
- 5 The **AI enablers** will be the **first adopters of AI**, driving both revenue and margin upside
- 6 **Monolithic players** will emerge along the AI value chain and over time, the AI market will be dominated by an **oligopoly of vertically integrated “AI foundries”**
- 7 **Software** will become **ubiquitous**
- 8 **Data assets** will emerge as the **competitive differentiators** for AI adopters
- 9 Despite the increasing number of new open-source models, **proprietary models** will remain the **top performers**
- 10 The **application** and **intelligence** layers will merge with **artificial general intelligence (AGI)**

CIO View 1

AI will be the **most profound innovation** and one of the **largest investment opportunities** in human history

Value creation in past cycles

Real US GDP per worker during innovation cycle, USD



1964-1981

Mainframe era
IBM System/360

1981-1993

PC era
IBM 5150
Personal

1993-2007

Internet era
The World
Wide Web

2007-2022

Mobile era
Apple Iphone

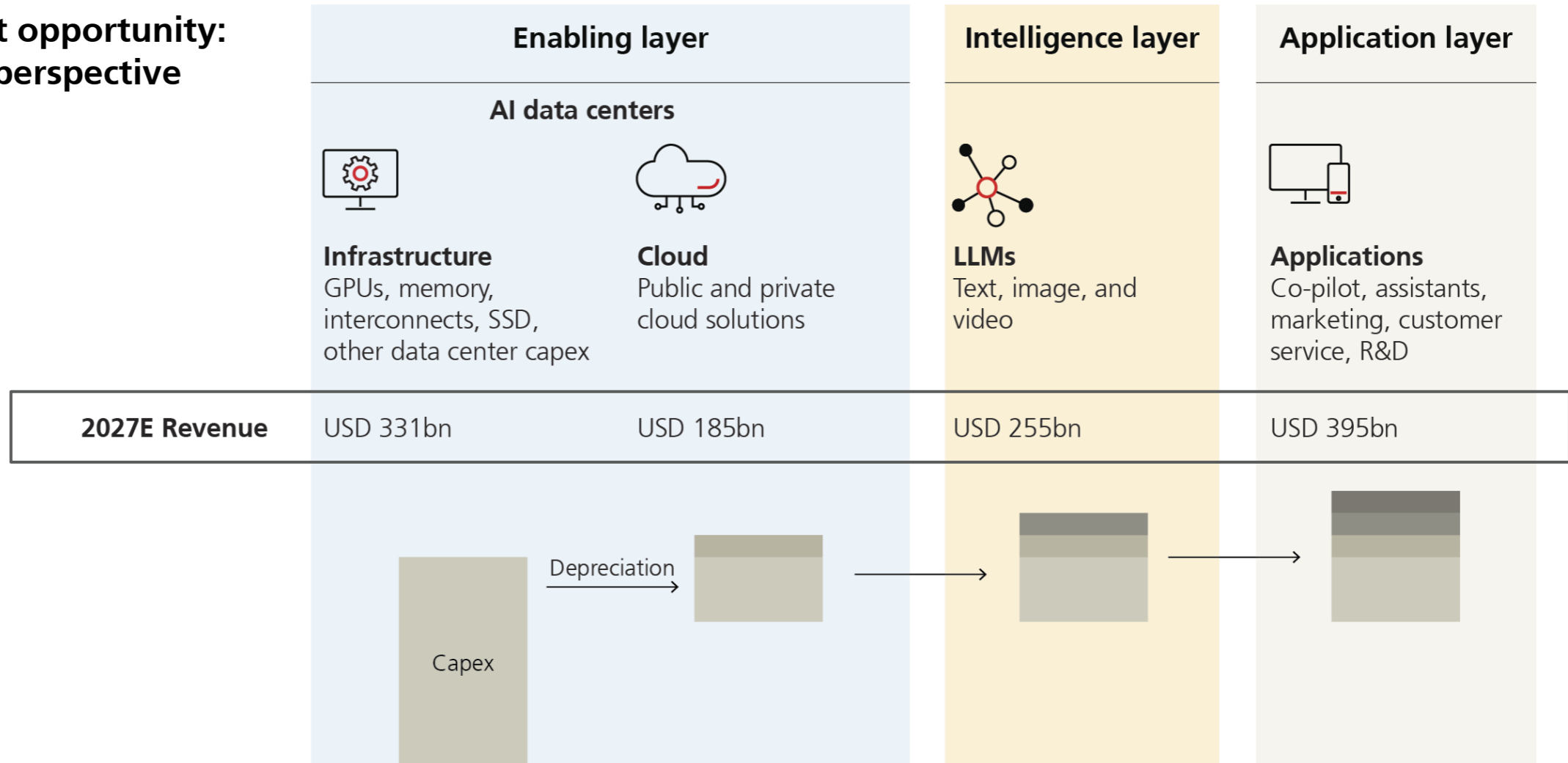
2022-?

AI era
ChatGPT

CIO View 2

The ratio of monetization potential of the AI application layer to the costs of the enabling and intelligence layers will become a key metric for investment returns

The AI market opportunity: a bottom-up perspective

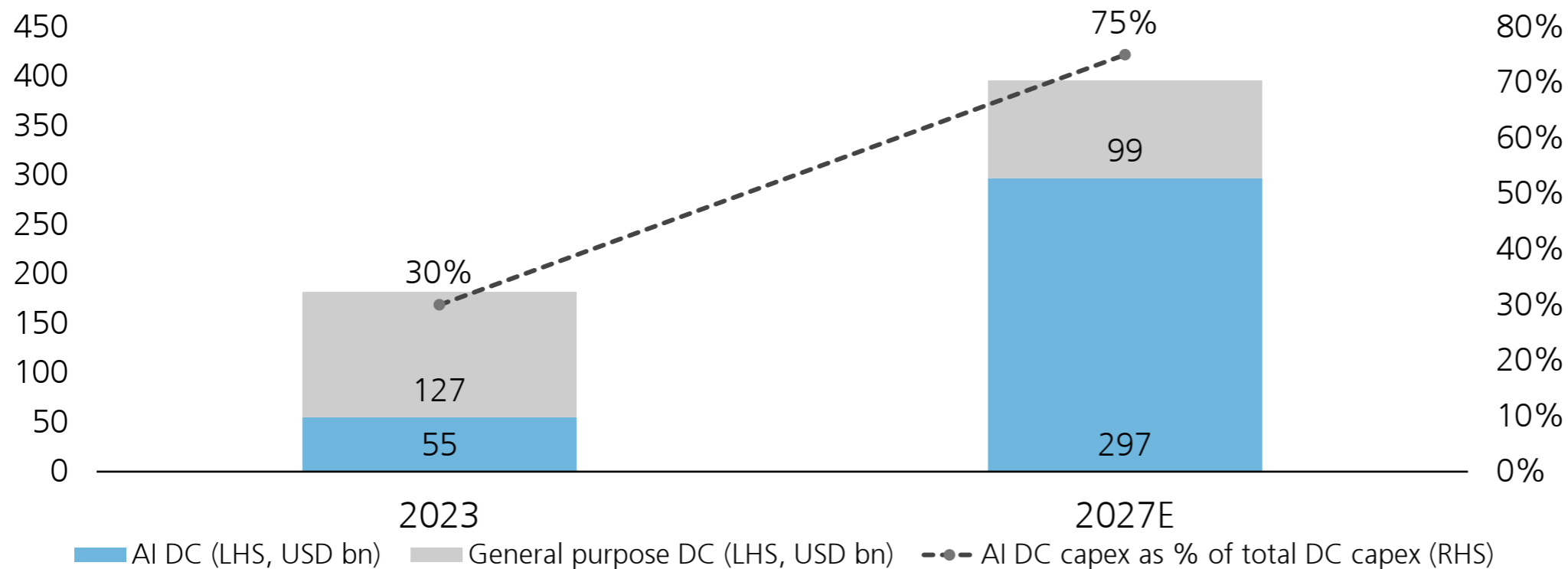


CIO View 3

AI will kick off a **data center capex cycle** that will dwarf general purpose data center capex in the next years

Annual capex for the enabling layer is expected to grow significantly by 2027

Split of estimated data center (DC) capex between AI and general purpose data centers, in USD bn and as a % of total

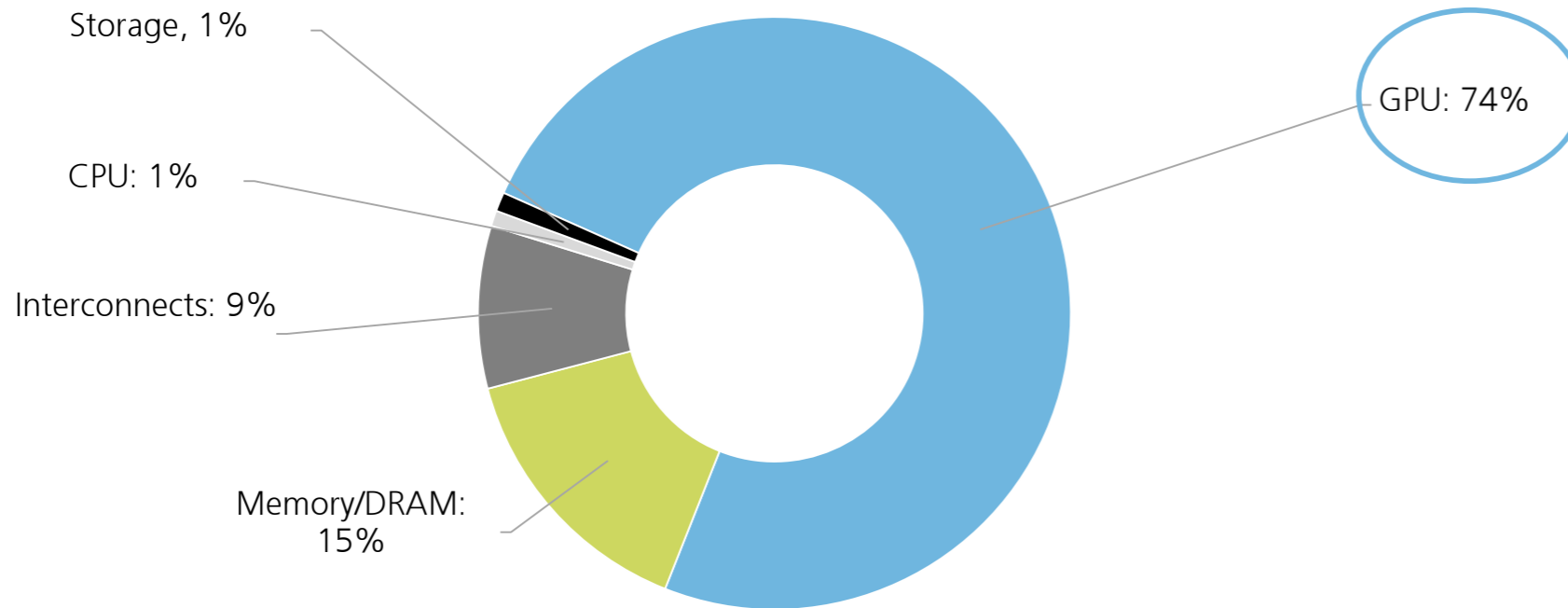


CIO View 4

The AI silicon moment: **AI chips** will capture a large part of the **value creation**

Over 70% of the bill of materials of an AI server is made up of GPU costs.

This makes it the largest beneficiary, followed by memory and interconnects, which make up 15% and 9% of the total costs, respectively. Representative AI server bill of materials, item categories, in % of total

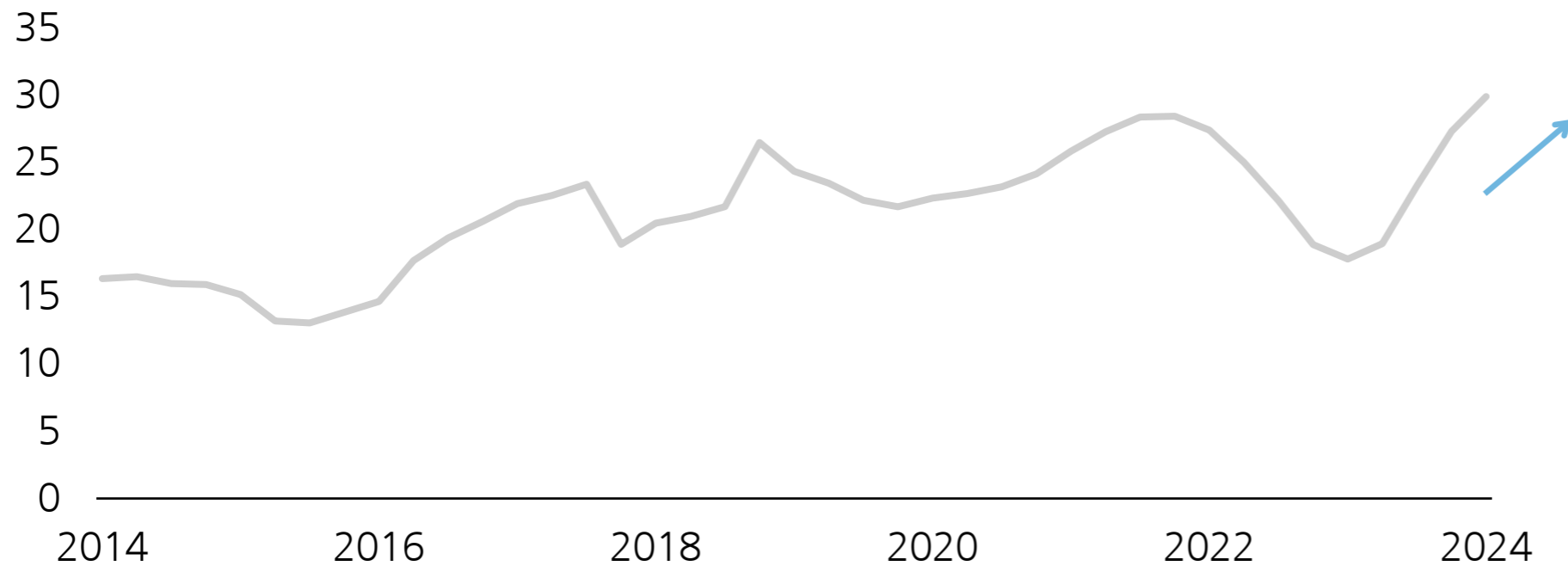


CIO View 5

The AI enablers will be the first adopters of AI, driving both revenue and margin upside

We expect margin expansion for enablers of genAI, such as hyperscalers, as they capture revenue from AI products and productivity gains

Average profit margin of select AI chip companies and cloud hyperscalers, in %



CIO View 6

Monolithic players will emerge along the AI value chain and over time, the AI market will be dominated by an oligopoly of vertically integrated “AI foundries”

With an attractive margin structure along the value chain, it is likely that an increasing number of companies will try to expand into different segments of the value chain

Positioning of well-known IT firms across the AI value chain

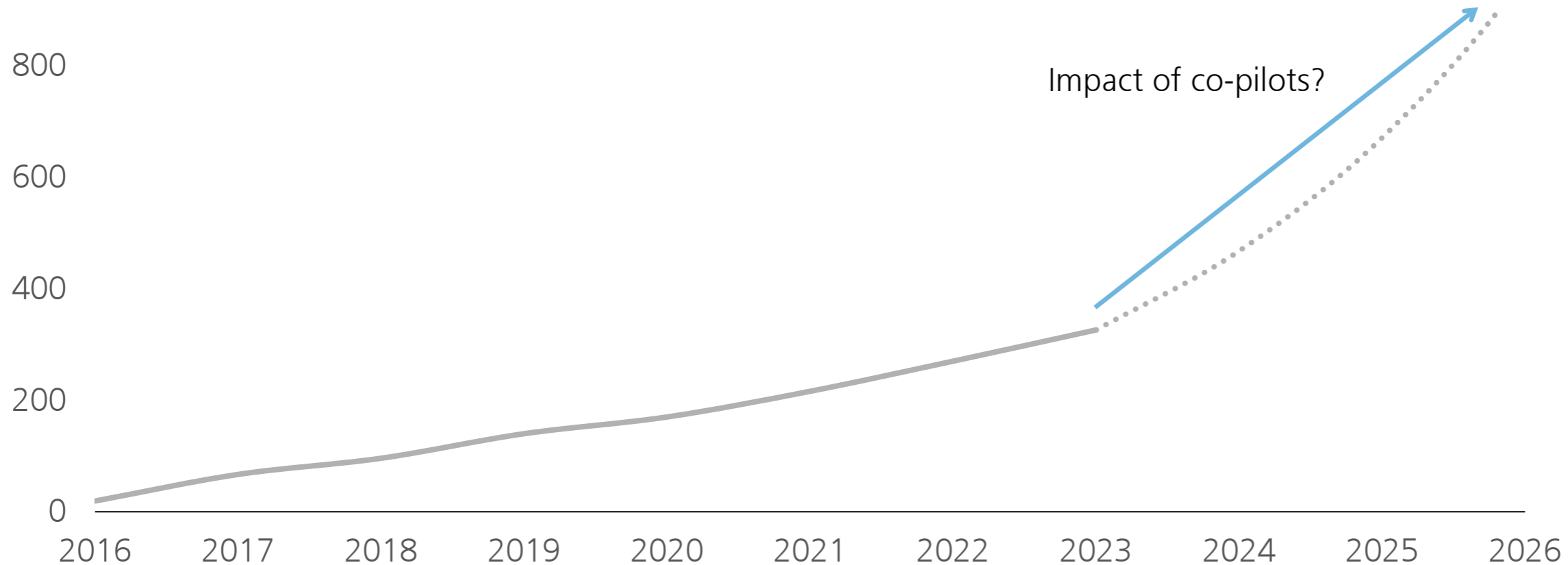
Company	Enabling layer		Intelligence layer	Application layer
	Chips	Cloud		
Google	TPUs	GCP	Gemini (formerly Bard)	Duet AI, Advertising
Microsoft	Maia	Azure	Open AI (investment)	Github, Office Co-pilot
Amazon	Trainium, Inferentia	AWS	?	Chat bot recommendations
Meta	MTIA	?	Llama	Advertising
Nvidia	GPUs	DGX	?	?
Tencent	?	Tencent Cloud	Hunyuan	Advertising
Baidu	?	Wangpan	Ernie	Baidu Comate
Alibaba	?	Aliyun	Qwen	Qwent-Agent
Huawei	GPUs	Huawei Cloud	PanGu	PanGu Drug Molecule Model

CIO View 7

Software will become ubiquitous

Productivity gains in coding development will accelerate the creation of software code

Total number of GitHub repositories*, assuming a growth rate 55% higher than the previous 5-year average



* centralized storage locations for data, code, models, and other resources

CIO View 8

Data assets will emerge as the competitive differentiators for AI adopters

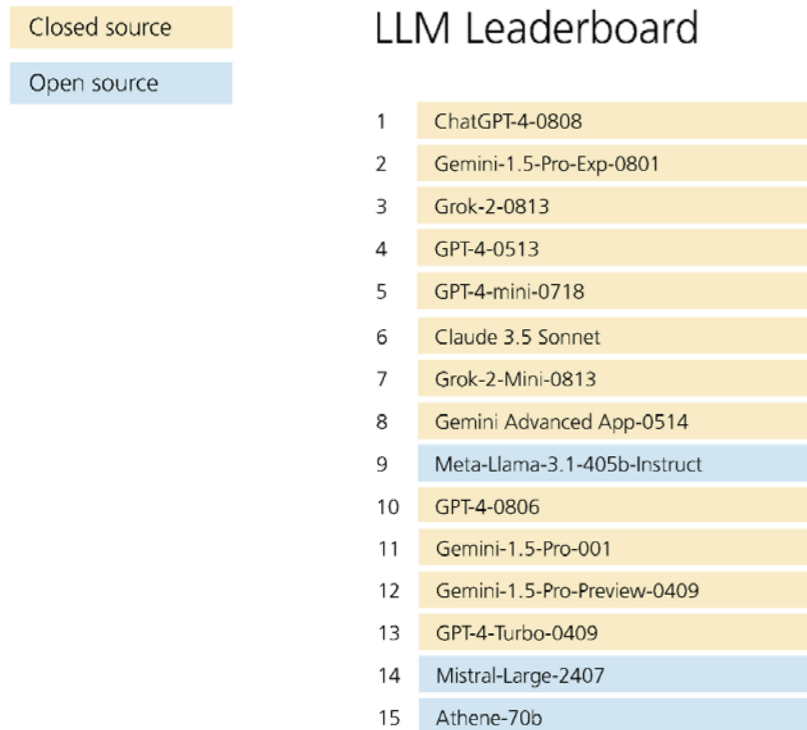
Proprietary data is a strategic asset.

	Data fromgives the ability to
Google Waymo	Millions of miles of autonomous driving	improve AI algorithms for navigation and safety
Amazon	Customer transaction history, reviews, software and infrastructure use	optimize machine learning services, provide AI tools to its customers
Microsoft	Data from Office products (Outlook, PowerPoint, Excel, Word)	optimize its AI offerings (natural language processing, computer vision, machine learning tools)
Meta	Data on user activities on its platform (e.g., likes, comments, time spent)	deliver personalized advertisements aimed to resonate with individual users
Apple	Users' health and fitness data, app usage data	develop advanced health and fitness tracking features, providing users with personalized insights and recommendations
NVIDIA	GPU performance, customer applications	optimize its AI hardware and software solutions, make them more efficient for deep learning and other AI tasks

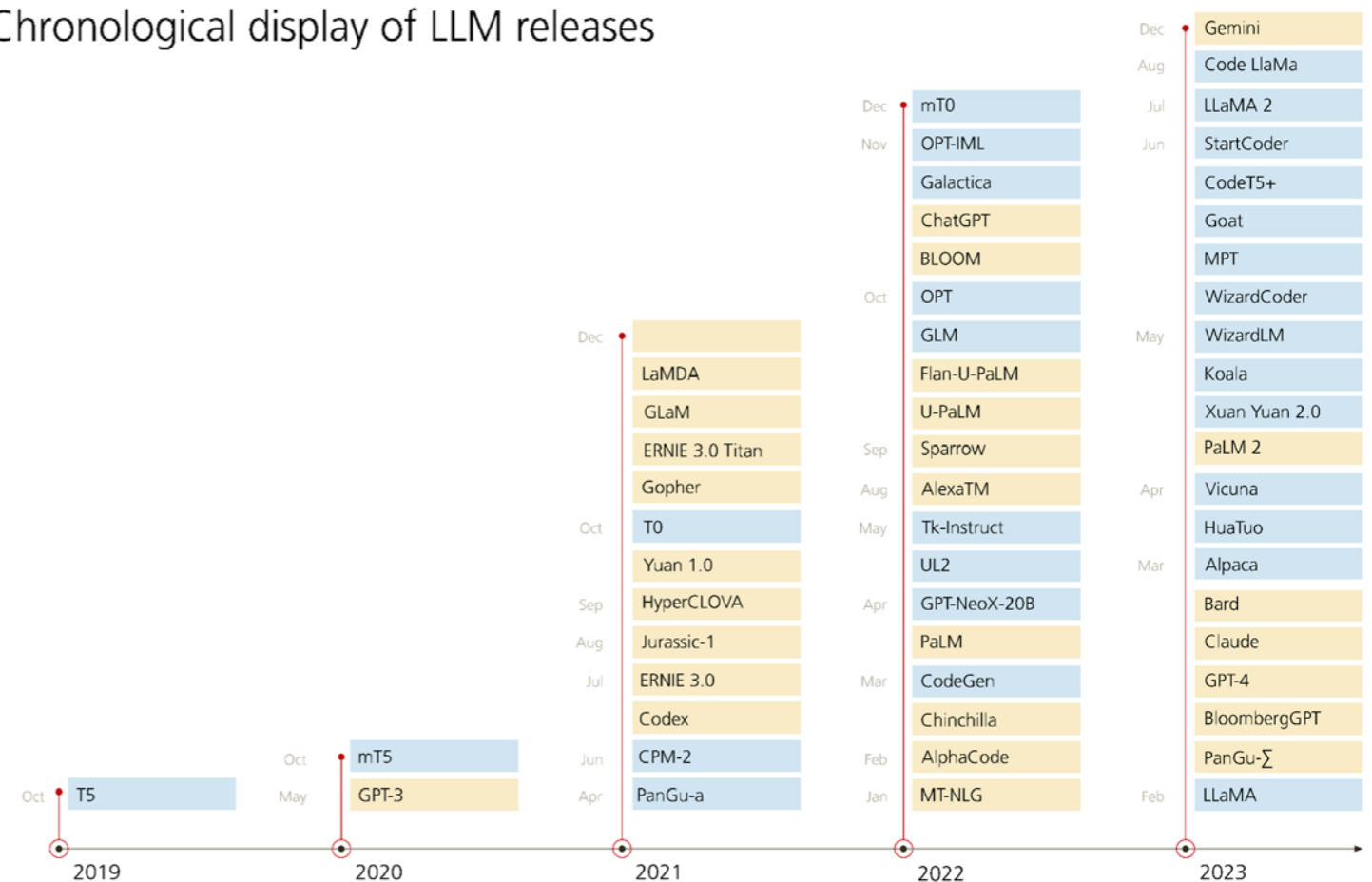
CIO View 9

Despite the increasing number of new open-source models, proprietary models will remain the top performers

The top performing models are closed source proprietary models as of Aug 2024. Increased capex for foundational models will limit open-source competition.



Chronological display of LLM releases

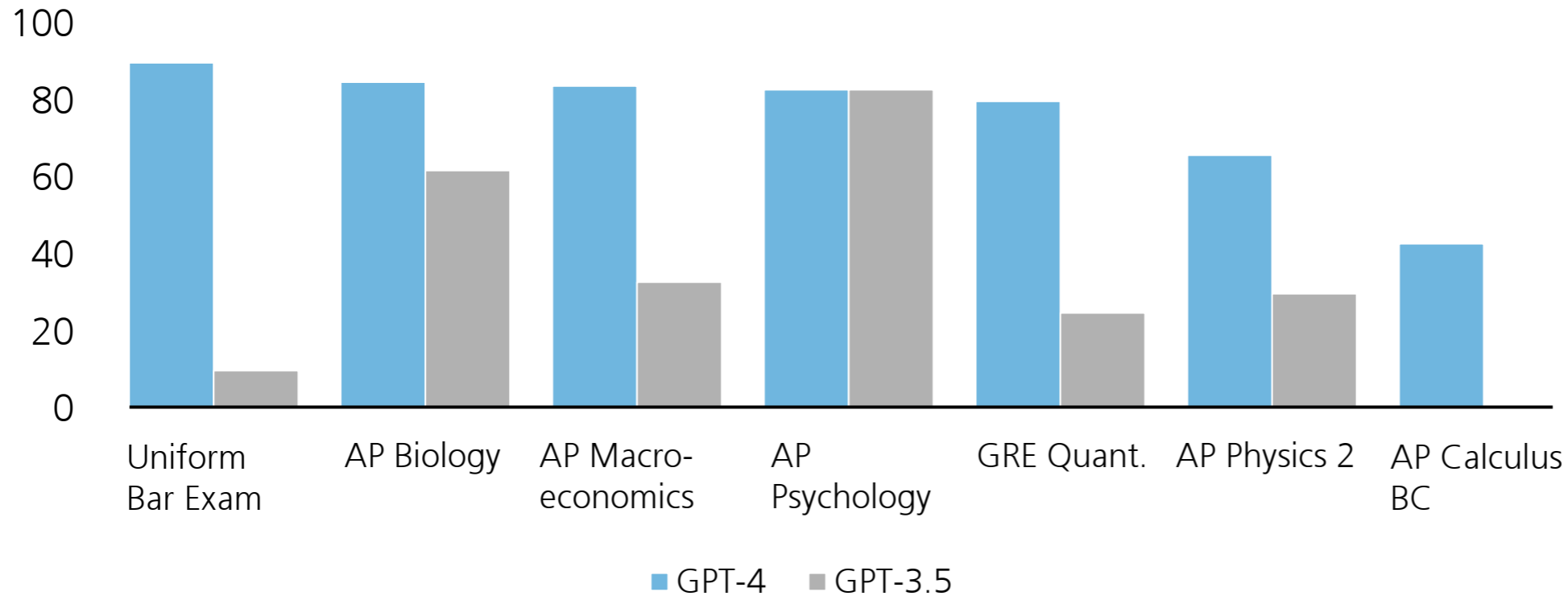


CIO View 10

The application layer and intelligence layers will merge with artificial general intelligence (AGI)

Single language models achieve above average scores across domain-specific exams

GPT-4 performance on academic and professional exams. Scores in performance percentile



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