Investment implications of Generative AI

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Allianz Global Investors 安聯投資
Amundi ASSET MANAGEMENT 東方匯理 資產管理
bct 銀聯集團

Fidelity INTERNATIONAL 富達
First Sentier Investors 首源投資
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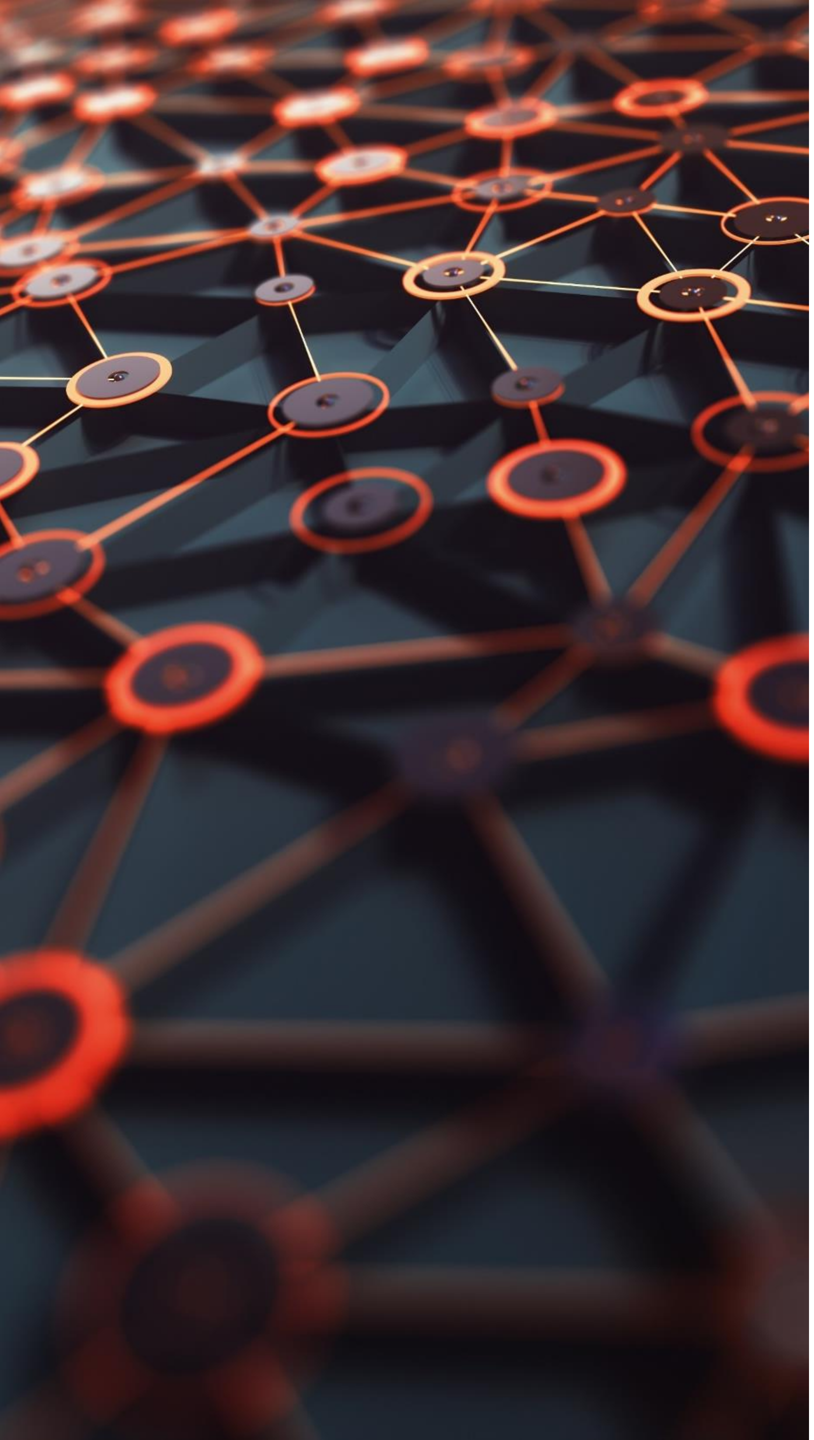

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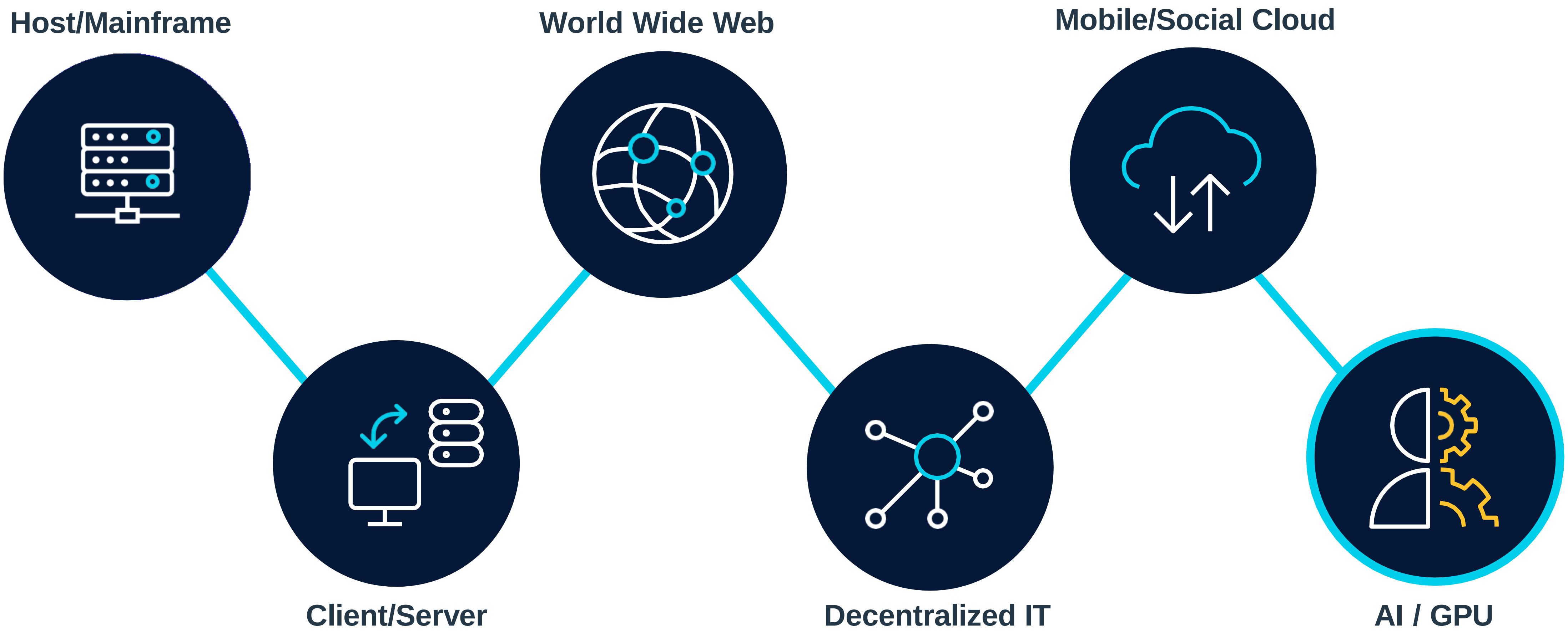
Investment Implications of Generative Artificial Intelligence (AI)

Rahul Ghosh, Product Specialist, Equity Division

Tech Innovation Cycles

Information Technology Maturity Enables AI



Source: IBM, Impact 2014 Presentation via SlideShare. IT=information technology; AI=artificial intelligence; GPU=graphics processing unit.

Generative AI is a breakthrough – Software writing software

Machine Learning (ML)

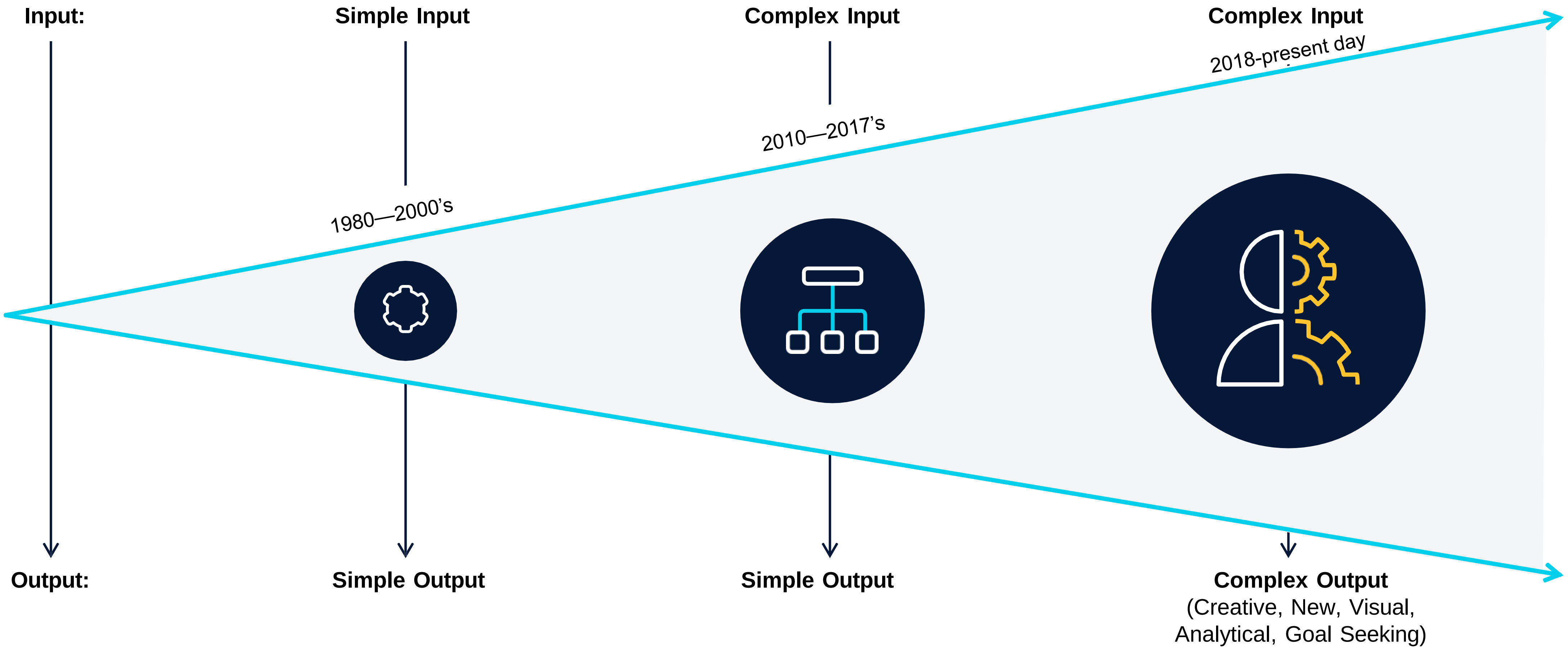
The ability to learn
without being programmed

Deep Learning (DL)

Neural networks adapt and learn
through vast amounts of data

Generative Pre-Trained Transformer (GPT)

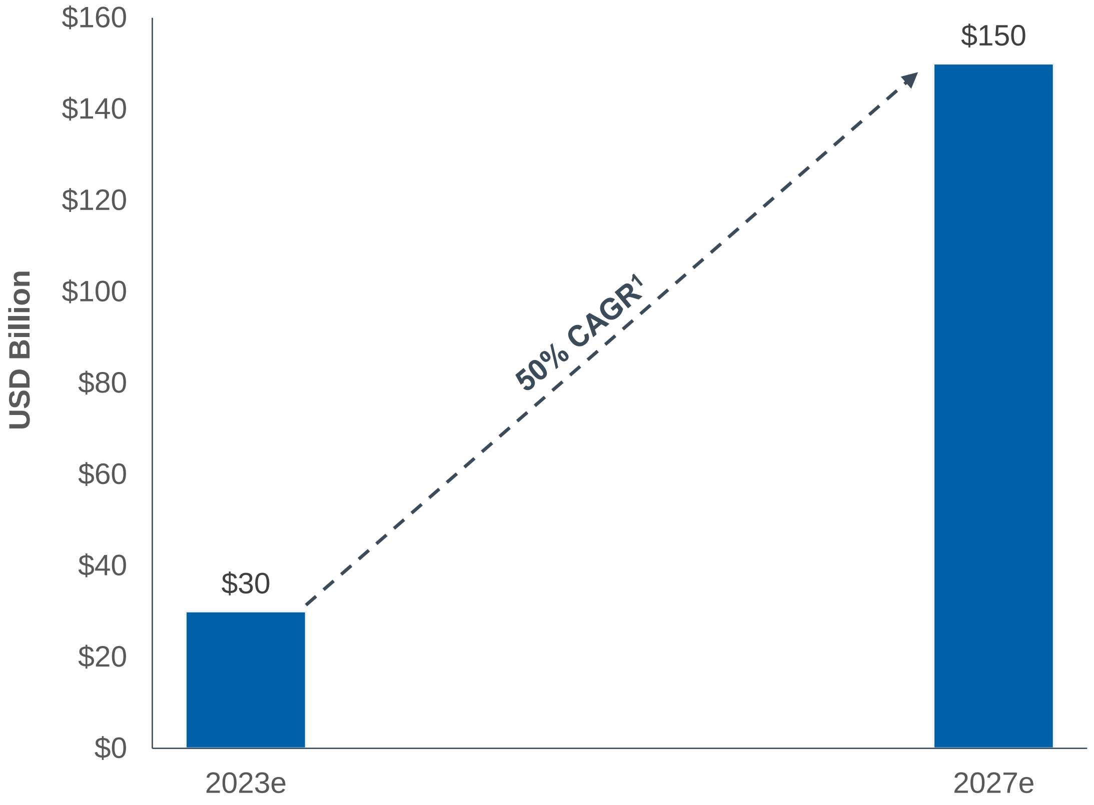
Large Language Model (LLM)
and framework for artificial intelligence



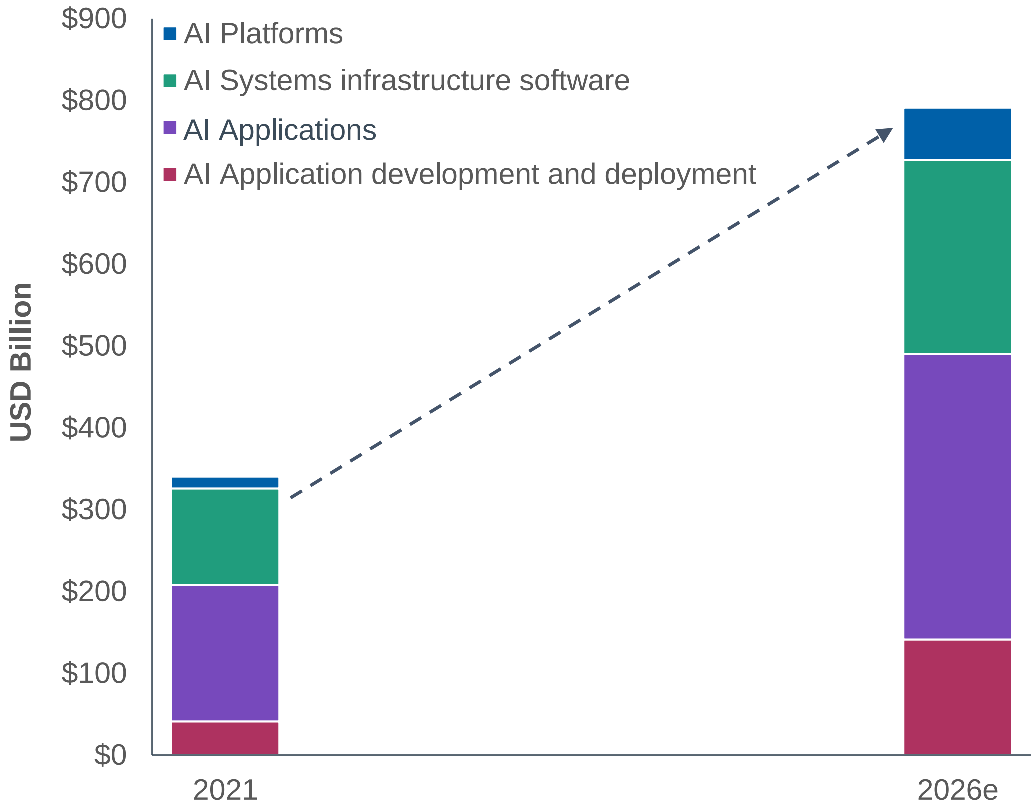
Rapidly Growing Markets

As of 30 June 2023

AI Chip Total Addressable Market



Worldwide AI Software Forecast— 2021–2026



Needs for AI compute and software – driving exponential growth

There is no guarantee that any forecasts made will come to pass.
[1] Compound Annual Growth Rate.
Source: AI Chip Market—AMD Data Center and AI Technology Premier; Software Forecast—William Blair Research based on data from IDC; Worldwide Semiannual Artificial Intelligence Tracker, 2H21.

The Layers of AI

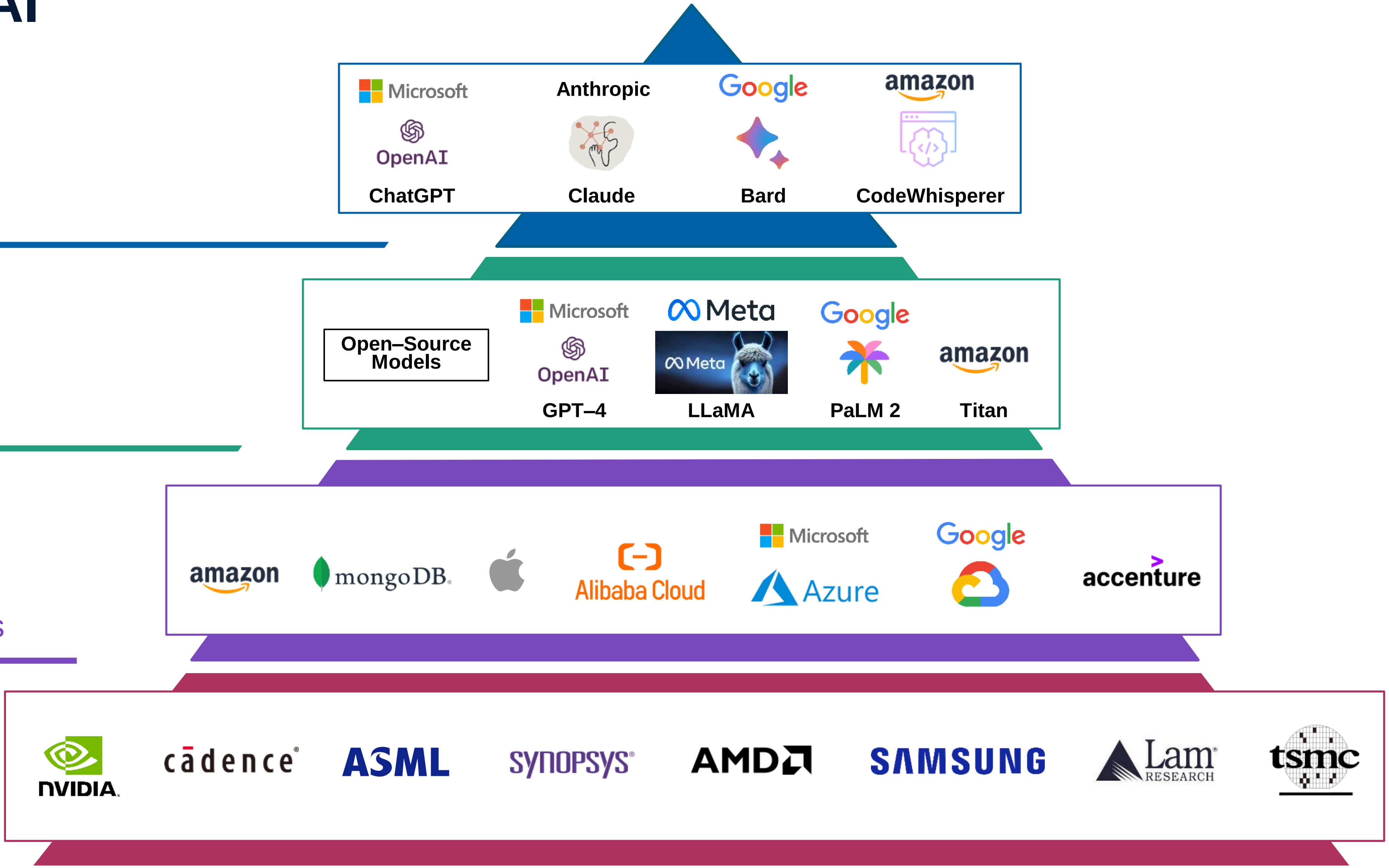
As of 30 June 2023

Applications/Other

Foundational Models

Infrastructure & Enablers

Chip Ecosystem



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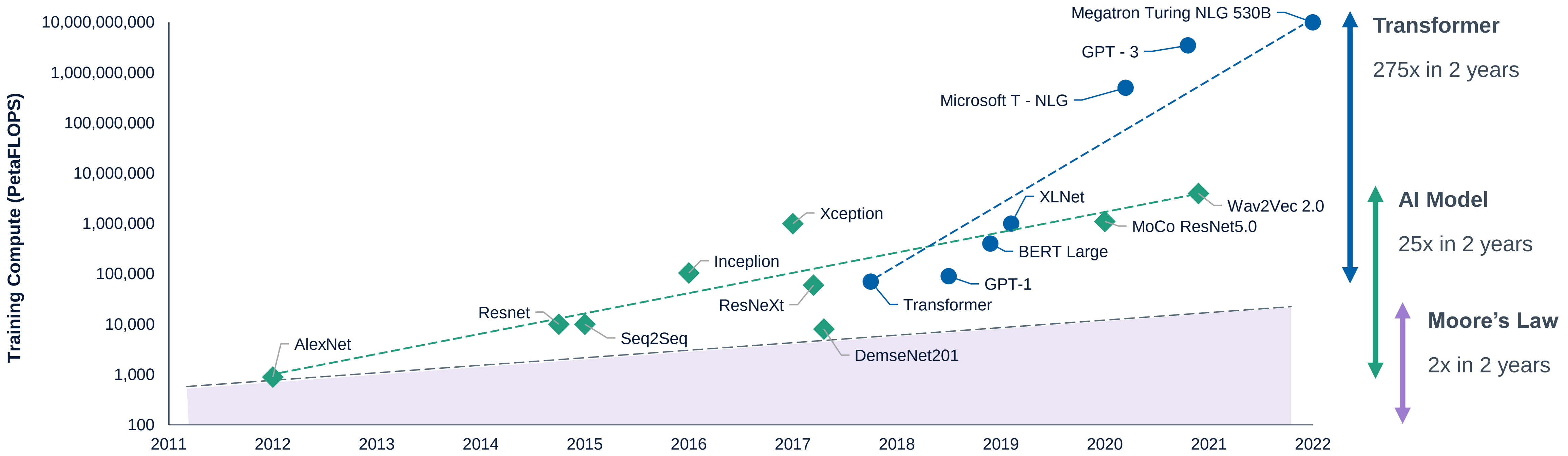
AI Implications—Increased Capital Intensity

As of 31 December 2022

Large Language Model Demand Outpacing Moore's Law



The current growth rate of computing power far exceeds Moore's Law, supercharging demand and necessitating innovation.

Source: NVIDIA Ian Buck Statement (2018), Huatai Research.

What It Takes To Win in AI

As of 31 August 2023

Compute Resources /Capital

- Huge compute needs
- High silicon intensity requires a lot of capital
- Do returns justify capital spend

Data

- All data not equal
- Public vs proprietary data
- Access to low cost data
- Internet / Mobile / Enterprise

Distribution

- Application first approach
- Open AI’s route to market?

Talent

- Concentrated in very few companies
- Best talent follows from the other three

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AI Benefits Platform Companies

As of 31 August 2023

Apple | Microsoft | Adobe | Meta | amazon

Technology Platforms: Compute Resources + Talent + Data + Distribution = **Potential Success**

- **Apple:** Upgraded iPhones with "super" apps that include **Generative AI technology**
- **Microsoft:** **AI tool within Office 365** will make tasks easier with CoPilot Model
- **Adobe:** **Integrating AI within Adobe's** creative software and large install base while managing digital rights
- **Meta:** **AI enhanced advertising** and using ecosystem data to overcome app tracking transparency
- **Amazon:** **Amazon provides a robust AI** platform and machine learning services

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Investment Framework

Understanding technology, anticipating changes, pay appropriate prices

Provide mission-critical, linchpin technologies	Improving fundamentals
Innovating in secular growth markets	Reasonable valuations

Repeatable investment framework that works to evaluate new and emerging technologies like Artificial Intelligence

Where are we seeing potential AI beneficiaries?

As of 31 August 2023

GPU

Can process **many pieces of data** simultaneously

EDA

Designs **Semiconductor chips**

Semi Cap equipment

Front end **Semi cap equipment** wafer processing

Infrastructure

Software and data analytics management

IT Services

IT applications bring AI to the enterprise

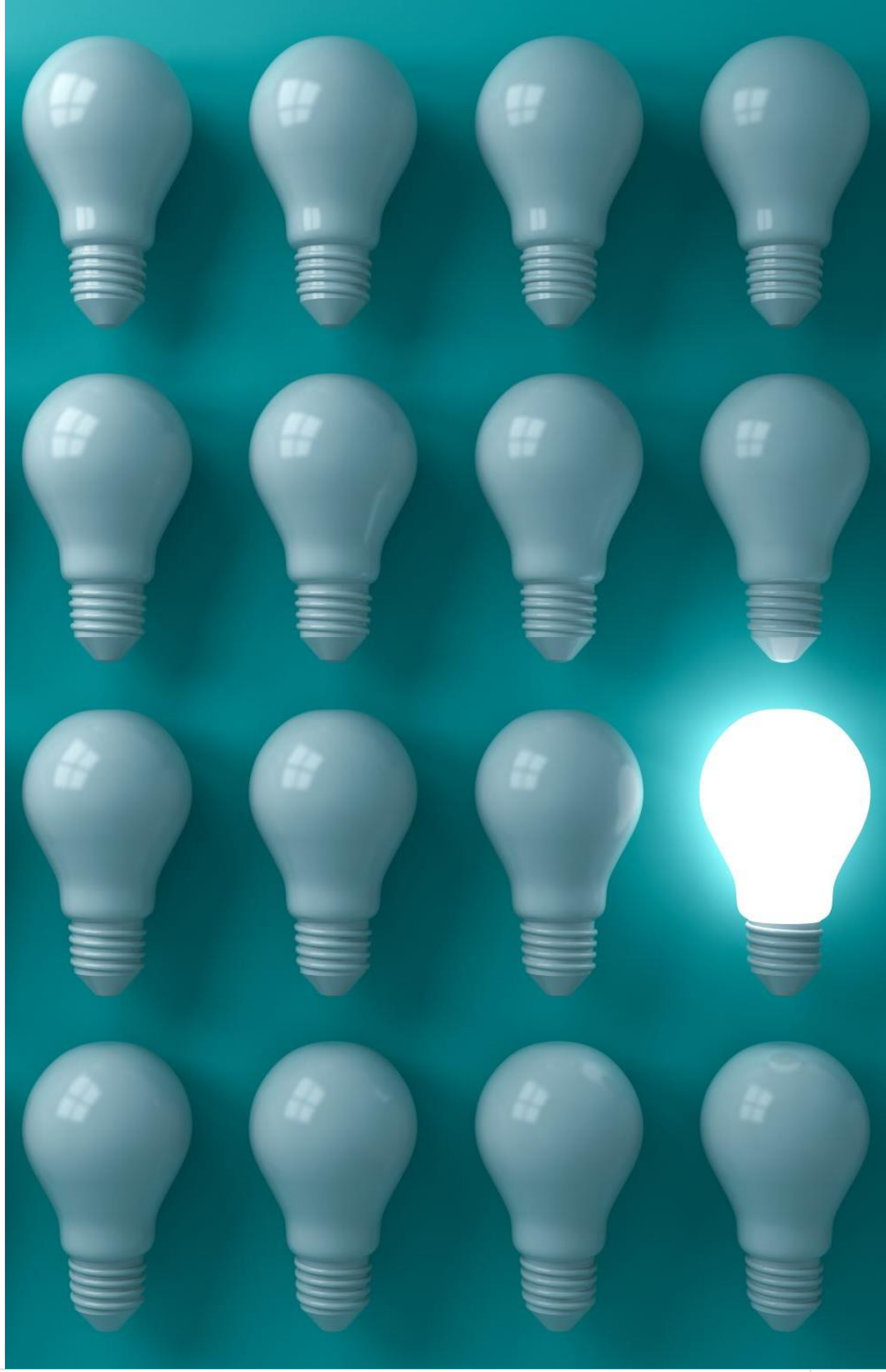
Technology Platforms

Access to **resources**, **data** & **distribution**

For illustrative purposes only. It is not intended to be investment advice or a recommendation to take any particular investment action. EDA=exploratory data analysis.

Summary

- AI requires a robust combination of compute, talent, data, and customers benefitting existing platform companies.
- Generative AI is incredibly semiconductor intensive due to its immense parallel processing requirements. One of the best ways to take advantage of Generative AI in this mega-trend has been via the picks and shovels, and other parts of the infrastructure layer.
- AI is poised to accelerate the death of Moore's Law, with GPUs leading the charge
- AI has been and may continue to be cyclical, yet its S-curve trajectory has often been underestimated by the market
- While we are cognizant of a mini bubble potentially forming, our job is to navigate this rapidly changing environment responsibly via our investment framework.
- Our outlook on technology continues to be positive as most stocks in our investment universe have accelerating organic growth and operating margin expansion as we look into 2024.



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