

THEMATICS

OVERVIEW AND OUTLOOK FOR AN ONGOING REVOLUTION

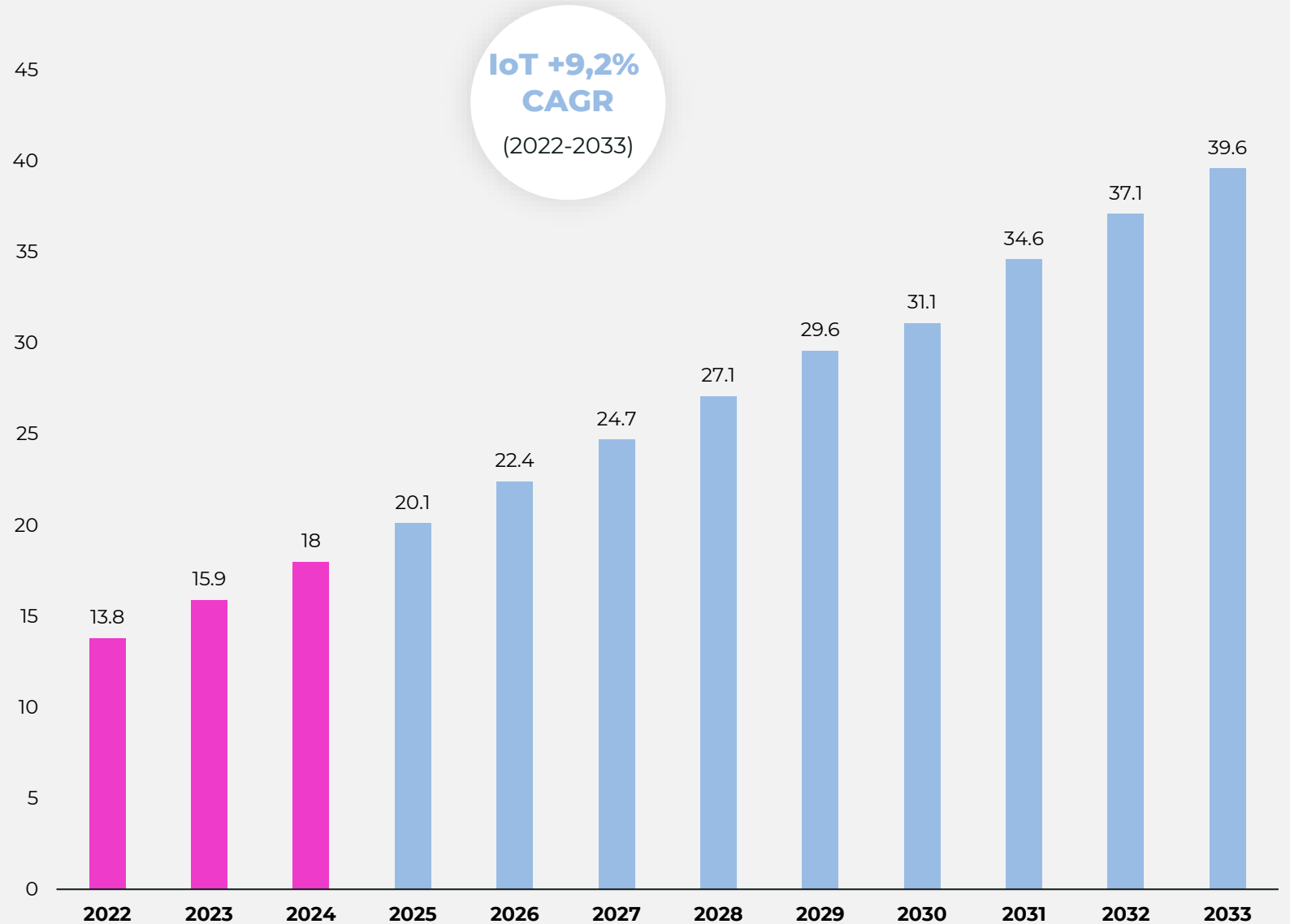
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AI OVERVIEW

Inflection point: The enablers

Connected everything...

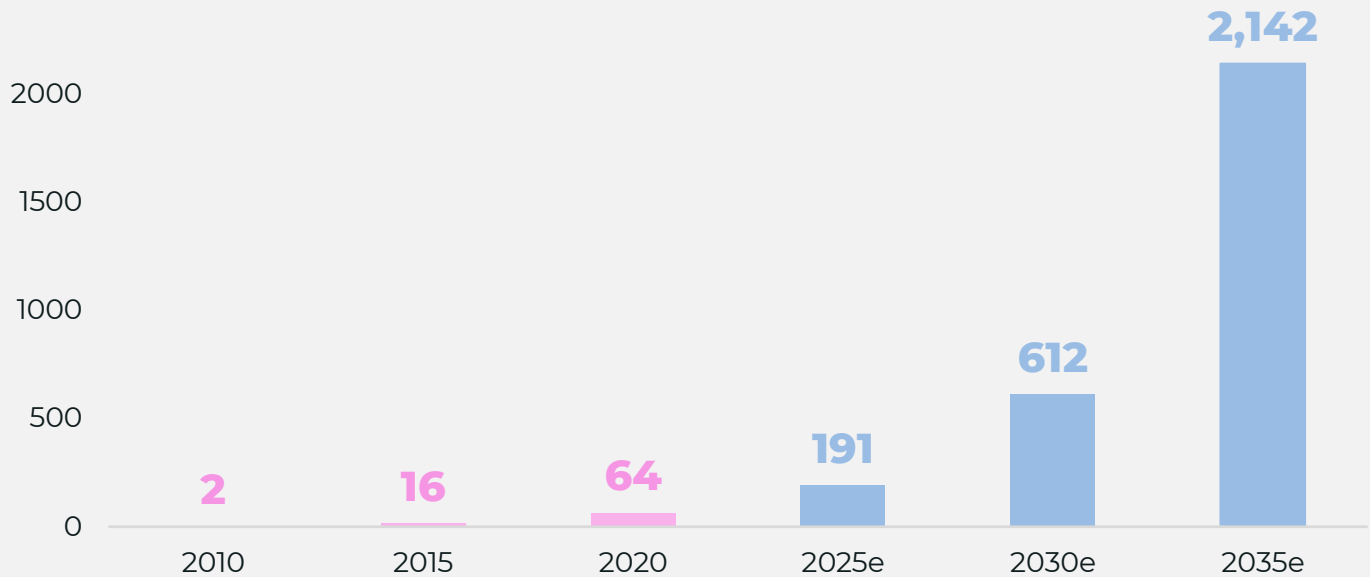


Sources: Transforma Insights; Exploding Topics, Statista, Thematics Asset Management as of June 2024.
There can be no assurance that developments may transpire as may be forecasted in this material

Inflection point: The enablers

...Enables big data...

Data created worldwide (in zettabytes)



BYTE
(8 BITS)

1 Byte = A Single Character
10 Bytes = A Single Word



KILOBYTE
(10^3 BYTES)

50 Kilobytes = A Compressed Image



MEGABYTE
(10^6 BYTES OR
1,000 KILOBYTES)

2 Megabytes = A High Resolution Photograph



EXABYTE
(10^{18} BYTES OR
1,000 PETABYTES)

5 Exabytes = All Words Ever Spoken by Human Beings



GIGABYTE
(10^9 BYTES OR
1,000 MEGABYTES)

1 Gigabyte = A Symphony in High-fidelity Sound



TERABYTE
(10^{12} BYTES OR
1,000 GIGABYTES)

10 Terabytes = The Printed Collection of the US Library of Congress



PETABYTE
(10^{15} BYTES OR
1,000 TERABYTES)

2 Petabytes = All US Academic Research Libraries



ZETTABYTE
(10^{21} BYTES OR
1,000 EXABYTES)

1 Zettabyte = 250bn DVDs

Sources: Statista 2022; amd.com (Advanced Micro Devices); Thematics Asset Management.

Inflection point: The enablers

... Analyzable
by high
computational
power.

Exponential development of computing power

UNIT	FLOPS*	DECADE
Hundred FLOPS	One hundred (10^2)	1940s
Kiloflops (KFLOPS)	One thousand (10^3)	1950s
Megaflops (MFLOPS)	One million (10^6)	1960s
Gigaflops (GFLOPS)	One billion (10^9)	1980s
Teraflops (TFLOPS)	One trillion (10^{12})	1990s
Petaflops (PFLOPS)	One quadrillion (10^{15})	2010s
Exaflops (EFLOPS)	One quintillion (10^{18})	2020s
Zettaflops (ZFLOPS)	One sextillion (10^{21})	?
Yottaflops (YFLOPS)	One septillion (10^{24})	-
Brontoflops (BFLOPS)	One octillion (10^{27})	-
Geoflops (GeFLOPS)	One nonillion (10^{30})	-



DESKTOP

Simulate one dynamic scenario of **a regional power grid** in real time



PETASCALE

Simulate tens of thousands of dynamic scenarios of **the national power grid** in real time

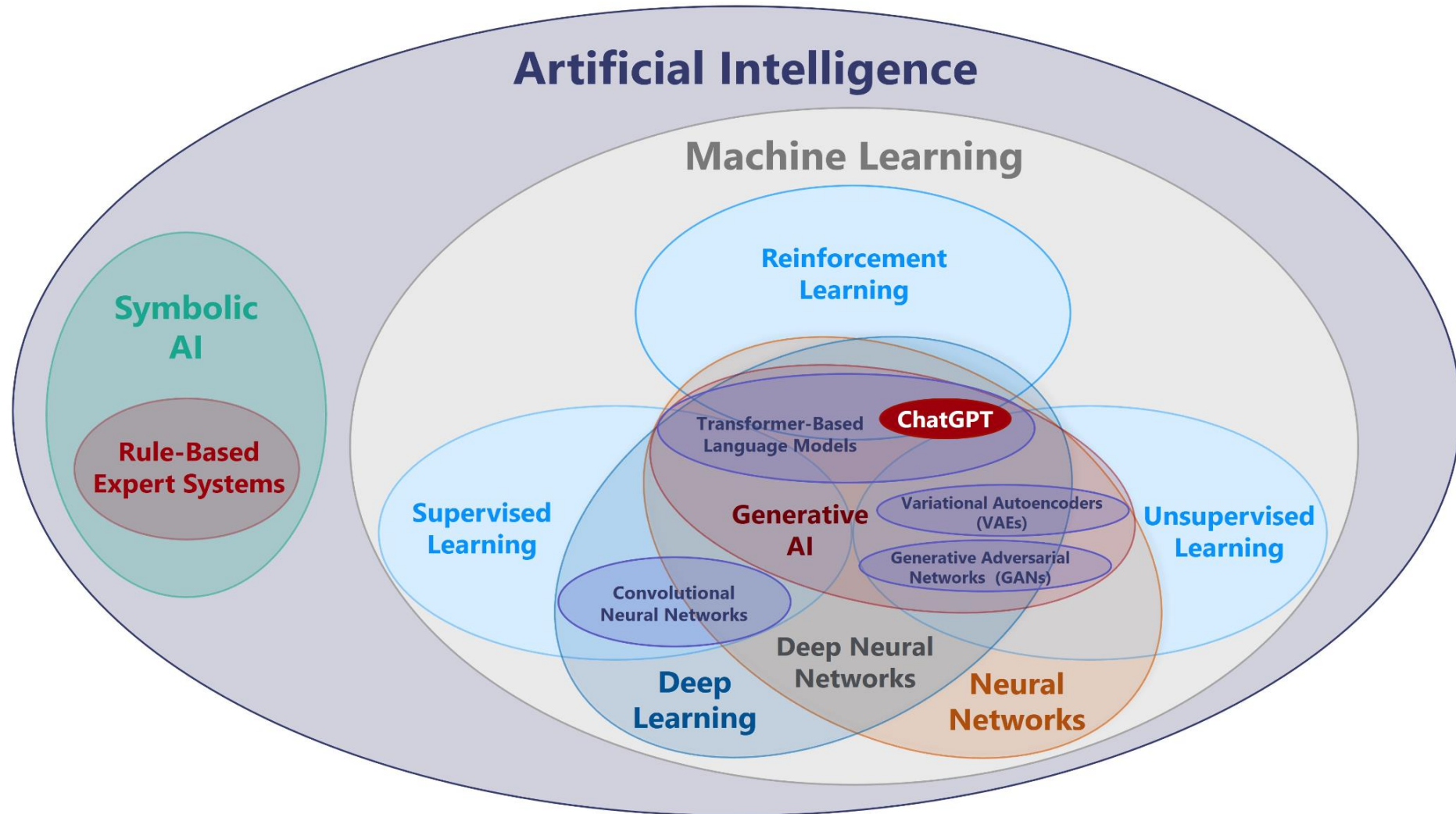


EXASCALE

Simulate millions of dynamic scenarios of **the global power grid** with undefined variables for generation and demand in real time

* FLOPS: Floating point operations per second
Source: amd.com (Advanced Micro Devices); Thematics AM.

The AI field



Various machine learning techniques & use cases

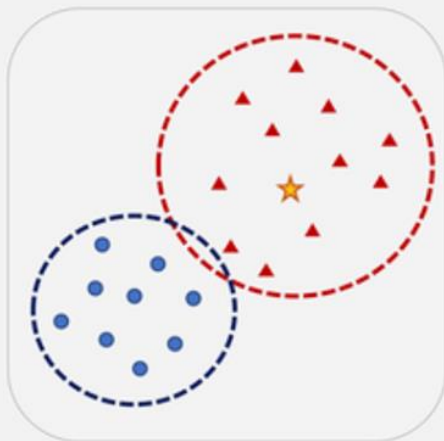
Machines Learning techniques

Supervised

To develop predictive models based on a dataset that contains labelled input-output data pairs, allowing it to make predictions on new, unseen data



Email spam detection & filter
Demand forecasting

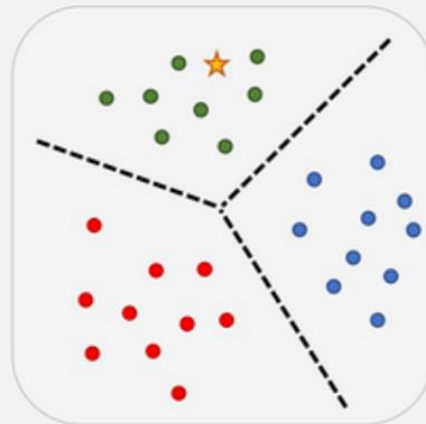


Unsupervised

To interpret and find hidden patterns, groupings or relationships in data without labeled outcomes.



Medical Imaging (diagnosis / prognosis)
Customer Segmentation

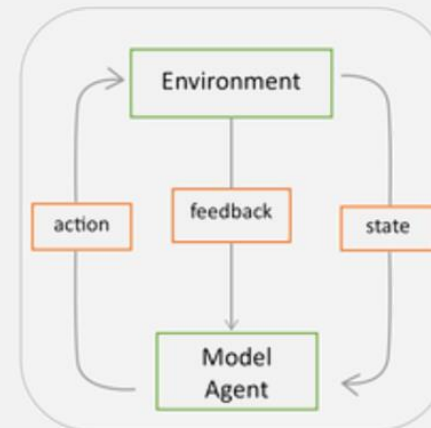


Reinforcement learning

To train an agent to maximize cumulative reward through trial and error in an environment, learning from feedback on its actions.



Board game playing
(Chess, Go...)

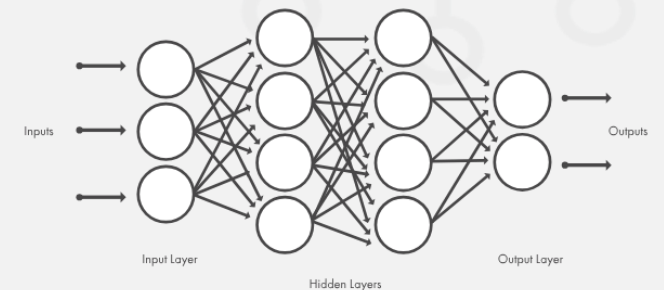


Deep learning

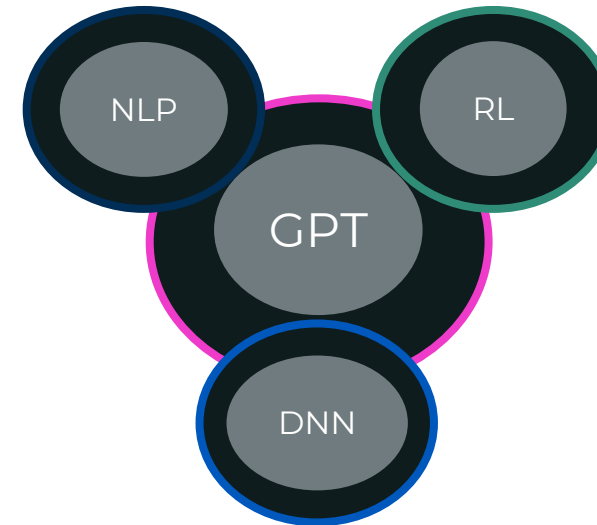
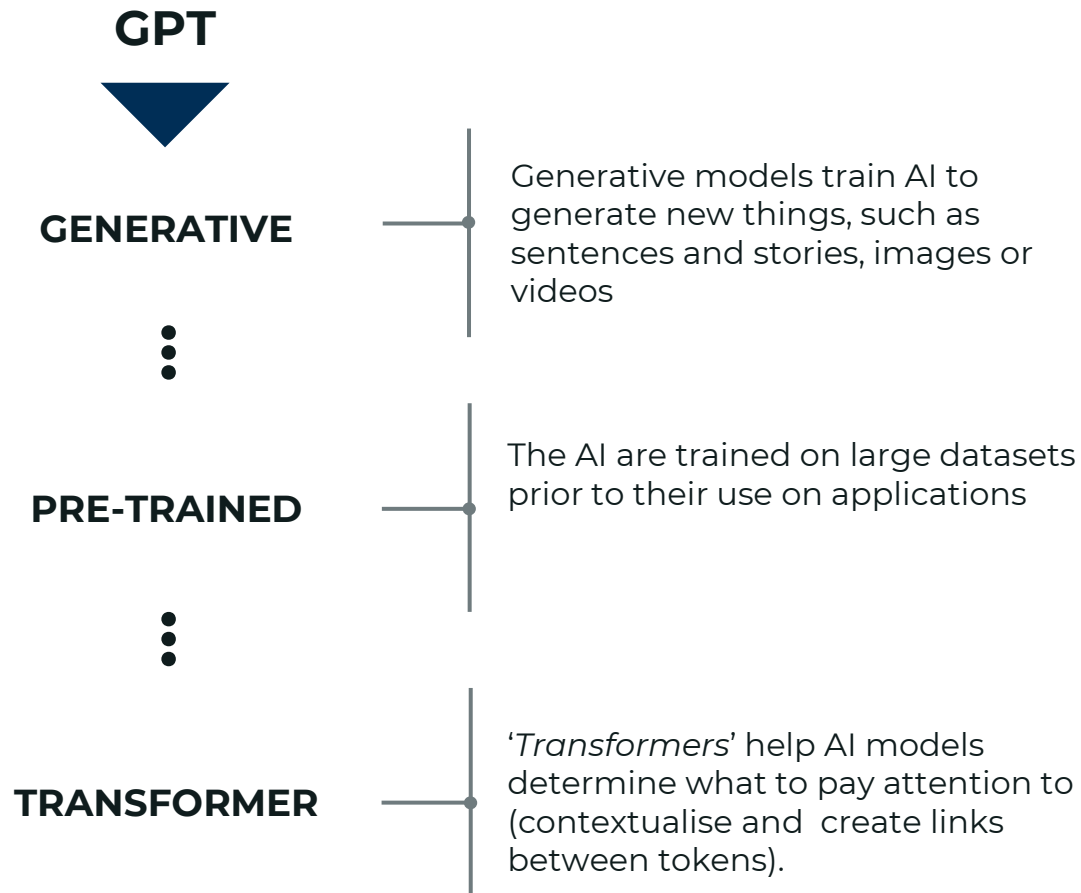
Model complex patterns in high-dimensional data using deep neural networks, which excel in tasks with unstructured data like images and text.



Self-driving cars (recognition of traffic signs, obstacles, pedestrians...)



What an LLM is



What makes LLMs different from other ML models?

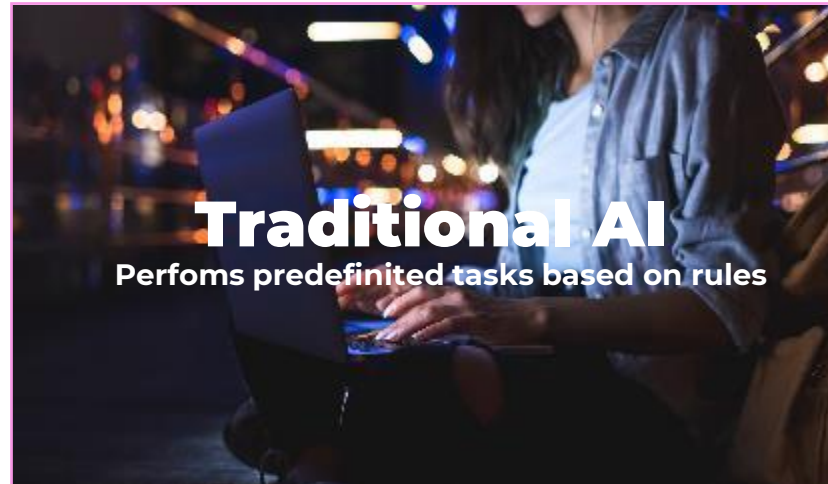
UNDERSTAND : the learning allows the model to understand prompts, instructions and process other text / image content

EXTRACT : Processing of huge data sets to extract relevant information

RESPOND : The ability for LLMs to 'understand' and generate responses in natural language and / or content consistent with initial queries

AI vs Generative AI

From analysis
to generative
innovation



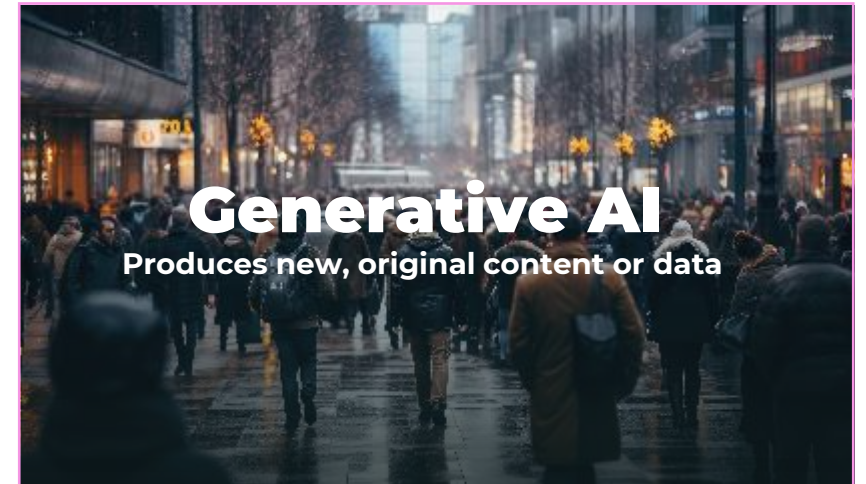
Strength
Good at specific task solving



Technological approach
Structured analysis, logical processes



Key features
Decision trees,
predictive modeling, pattern recognition



Strength
Creative, innovative

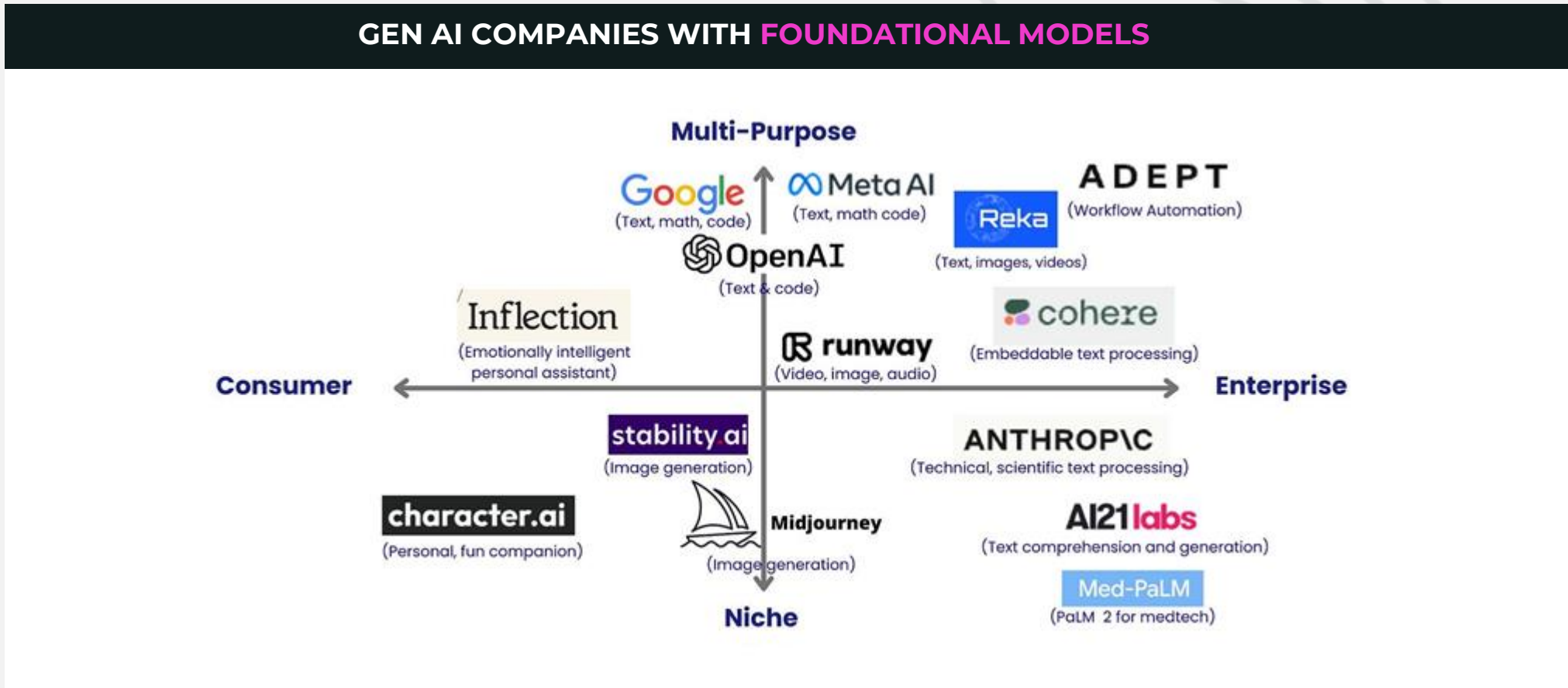


Technological approach
Deep learning, neural networks
dynamic



Data requirements
Use large structured/unstructured
datasets for training

Generative AI foundational models

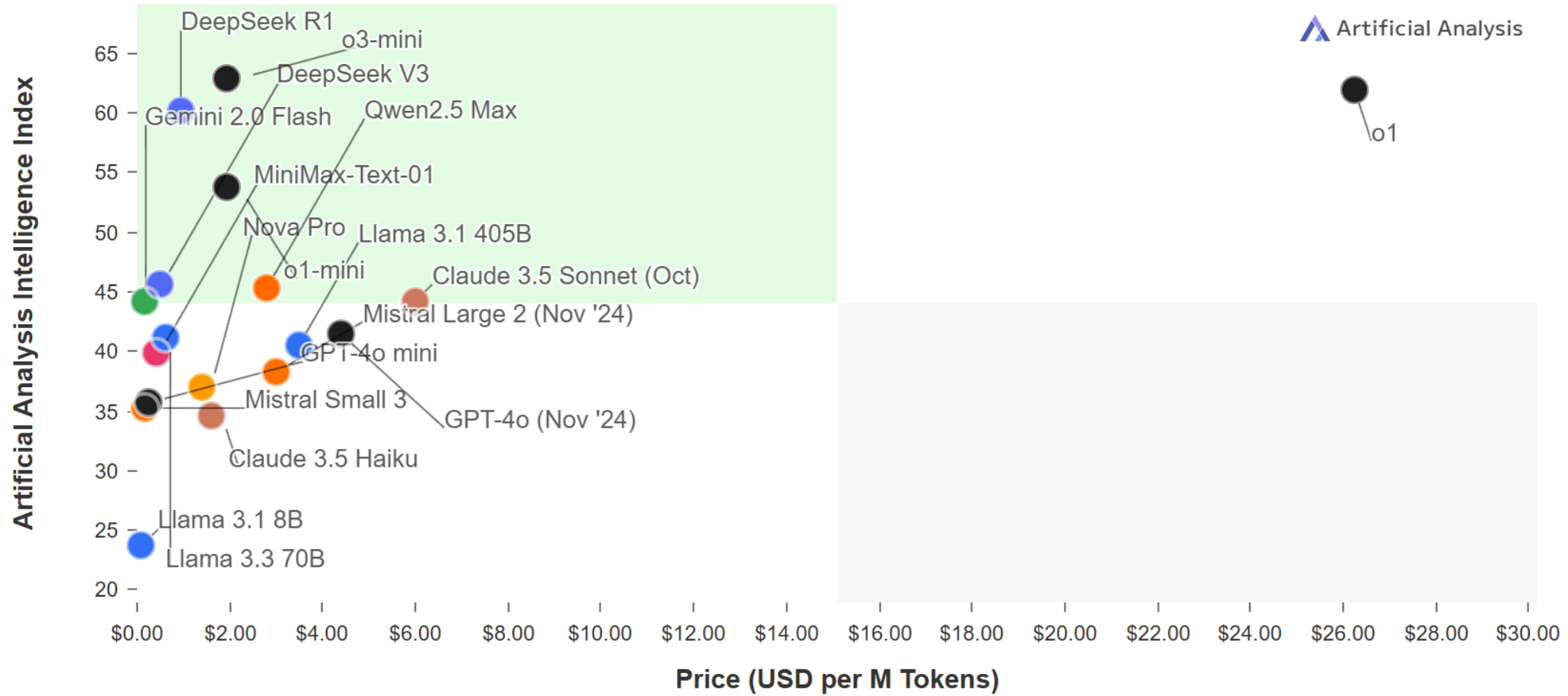


Sources: The Strategy Deck, Thematics Asset Management as at July 2023.

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The DeepSeek phenomenon

A RACE TO THE BOTTOM : COST EFFICIENCIES OF VARIOUS LLMs



The DeepSeek phenomenon



VS



→ 2 months, <\$6 million

Development Timeline & Cost

→ Several months, estimated at \$78 million

→ 671 billion parameters
→ 37 billion activated per token

Model Parameters

→ 1.8 trillion parameters accross 120 layers

→ Trained on 14.8 trillion tokens
→ Requiring 2.788 million GPU hours

Training Data and Computational Resources

→ Trained on 13 trillion tokens
→ 25,000 NVIDIA A100 GPUs over 90-100 days

→ Outperforms Meta's Llama 3.1 / OpenAI's GPT-4, & Anthropic's Claude Sonnet 3.5 in benchmark tests

Performance Benchmarks

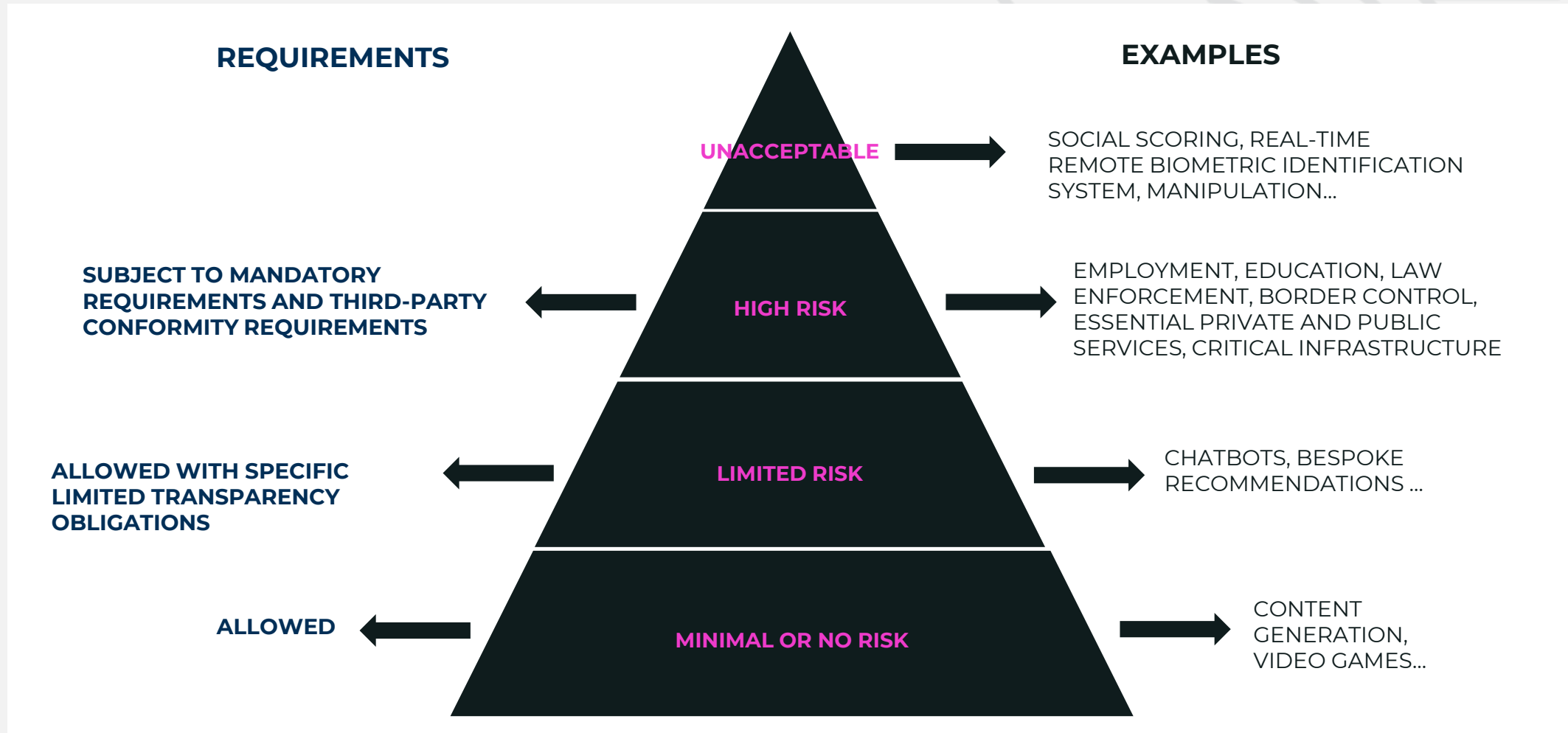
→ Advanced capabilities
→ benchmark comparisons with DeepSeek AI are not detailed

→ Open-source & allowing unrestricted access

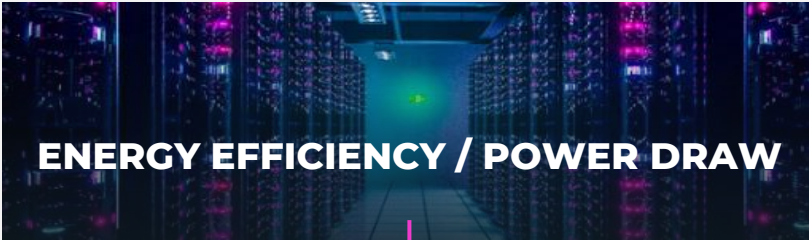
Pricing and Accessibility

→ Proprietary model with access to OpenAI's API (fees)

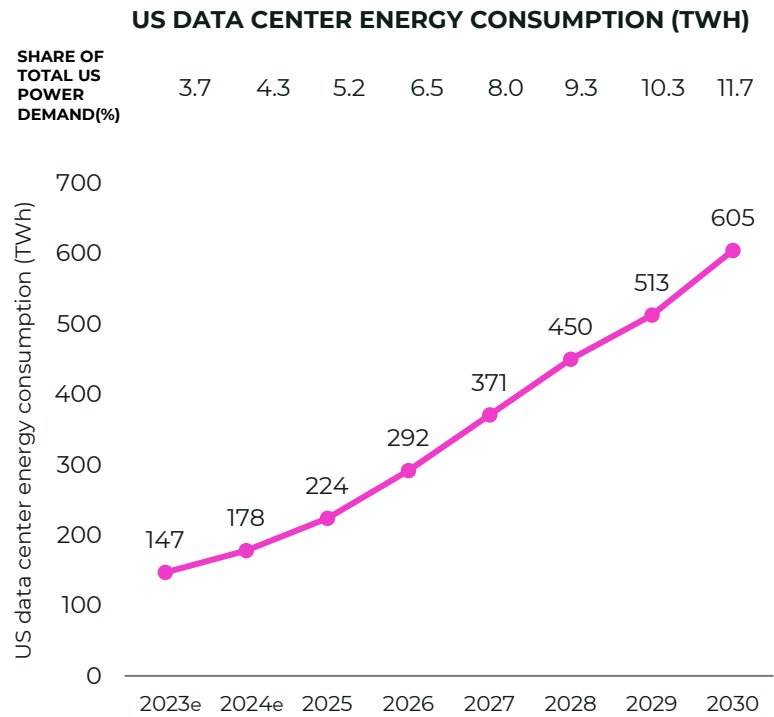
EUROPEAN AI ACT



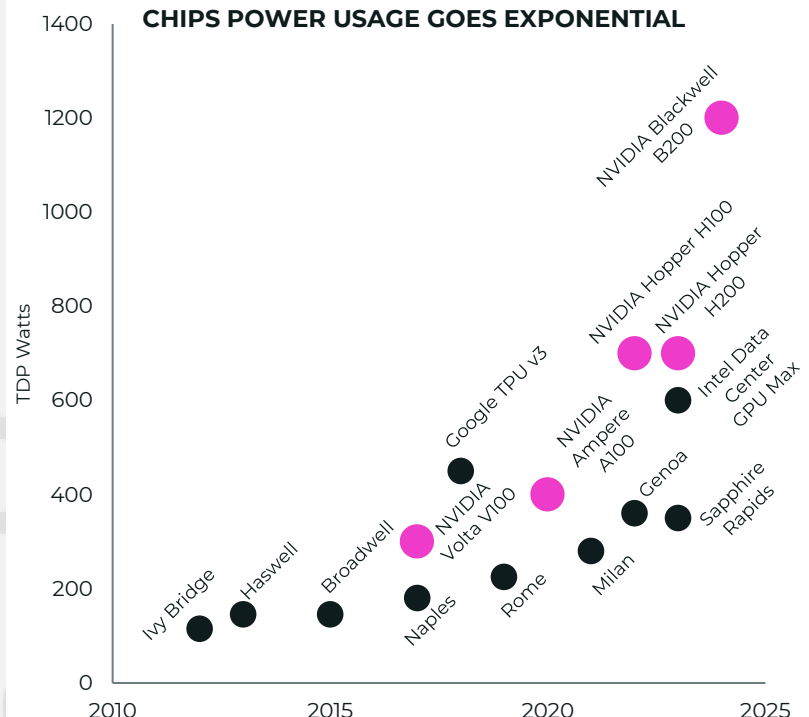
AI FOCAL POINTS CHALLENGES



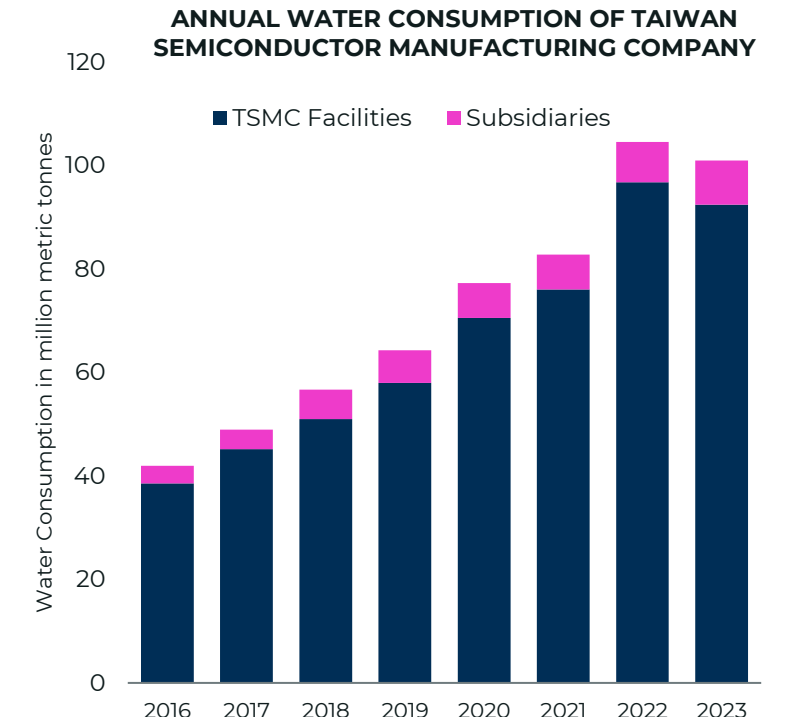
ENERGY EFFICIENCY / POWER DRAW



DATA CENTER COOLING SYSTEMS



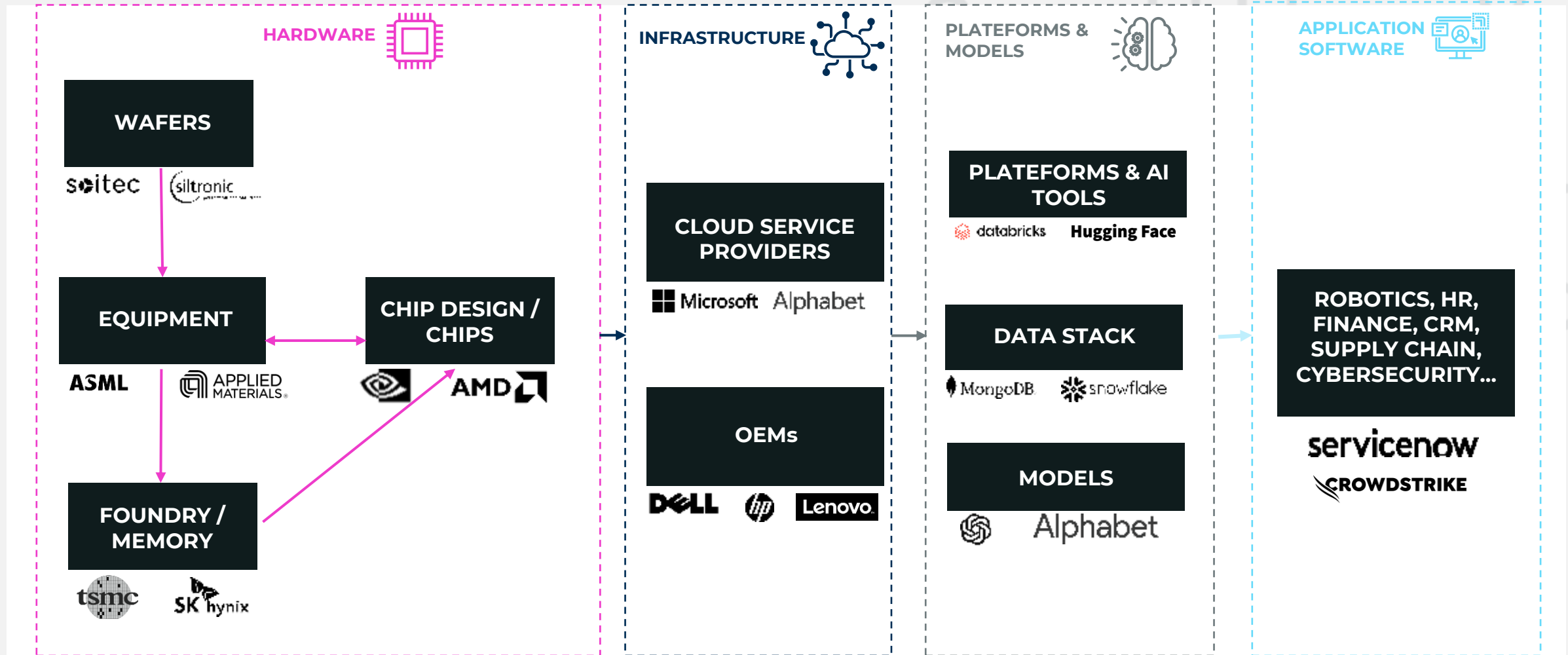
WATER CONSUMPTION / AVAILABILITY



Source: Global Energy Perspective 2023, McKinsey (1), BofA Global Research, Dell Technologies, Uptime Institute (2), Statista 2025(3)

INVESTMENT OPPORTUNITY

AI thirst for computing power and data : Fancy an IPA?



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INVESTMENT OPPORTUNITY

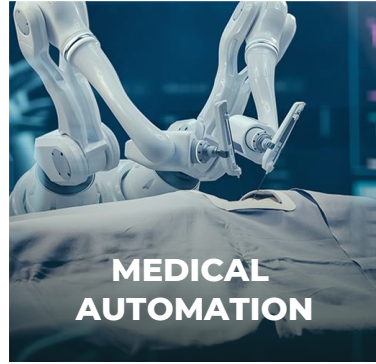
Our opportunity set



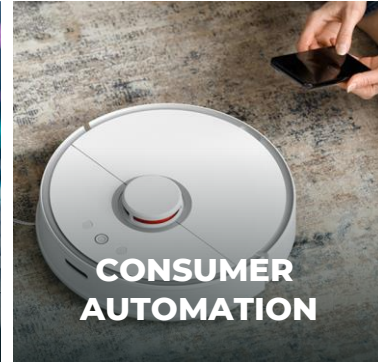
- Industrial robots
- Logistics automation
- Automation tools
- Industrial IoT



- CAD & simulation
- EDA



- Surgical robots & rehabilitation
- Lab automation
- Precision medicine & intelligent diagnosis
- 'In silico' research



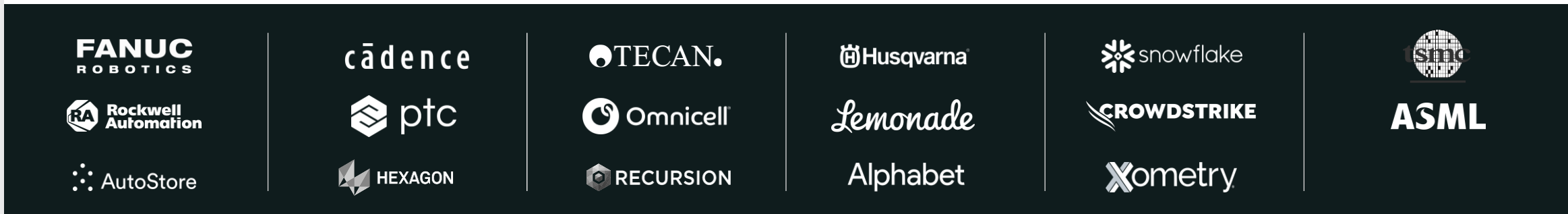
- Household automation
- AI-based online services



- Vertical software
- Cybersecurity
- Workflow automation
- Data management & insights
- Generic AI tools



- Fabless & IDMs
- Semi manufacturing
- Autonomous mobility



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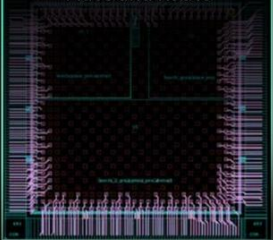
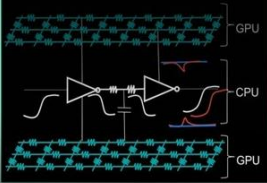
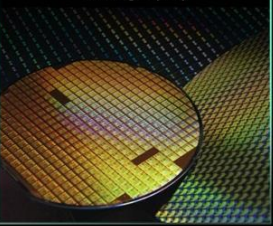


INVESTMENT OPPORTUNITY

Use Case : EDA



SYNOPTIS: MISSION CRITICAL FOR NVIDIA SILICON SUCCESS

- Decades of collaboration across full EDA suite powers accelerated computing

<p>13X</p> <p>Verification Functional Verification</p>  <ul style="list-style-type: none">• Synopsys VCS• NVIDIA L40• NVIDIA Grace Hopper	<p>10X</p> <p>Design Place and Route</p>  <ul style="list-style-type: none">• Synopsys Fusion Compiler• NVIDIA Grace Hopper	<p>15X</p> <p>Simulation SPICE Simulation</p>  <ul style="list-style-type: none">• Synopsys PrimeSim• NVIDIA Hopper• NVIDIA Grace Hopper	<p>15X</p> <p>Manufacturing Computational Lithography</p>  <ul style="list-style-type: none">• Synopsys Proteus• NVIDIA cuLitho• NVIDIA Grace Hopper	<p>Generative AI Industry's 1st LLM-Based GenAI EDA Solution</p>  <p>SYNOPTIS AI COPILOT</p> <ul style="list-style-type: none">• Synopsys.ai• NVIDIA NeMo & NIM• NVIDIA DGX	<p>Systems Software Testing & Validation of Automotive Software</p>  <ul style="list-style-type: none">• Synopsys Electronics Digital Twin, vECU, TPT• NVIDIA Omniverse
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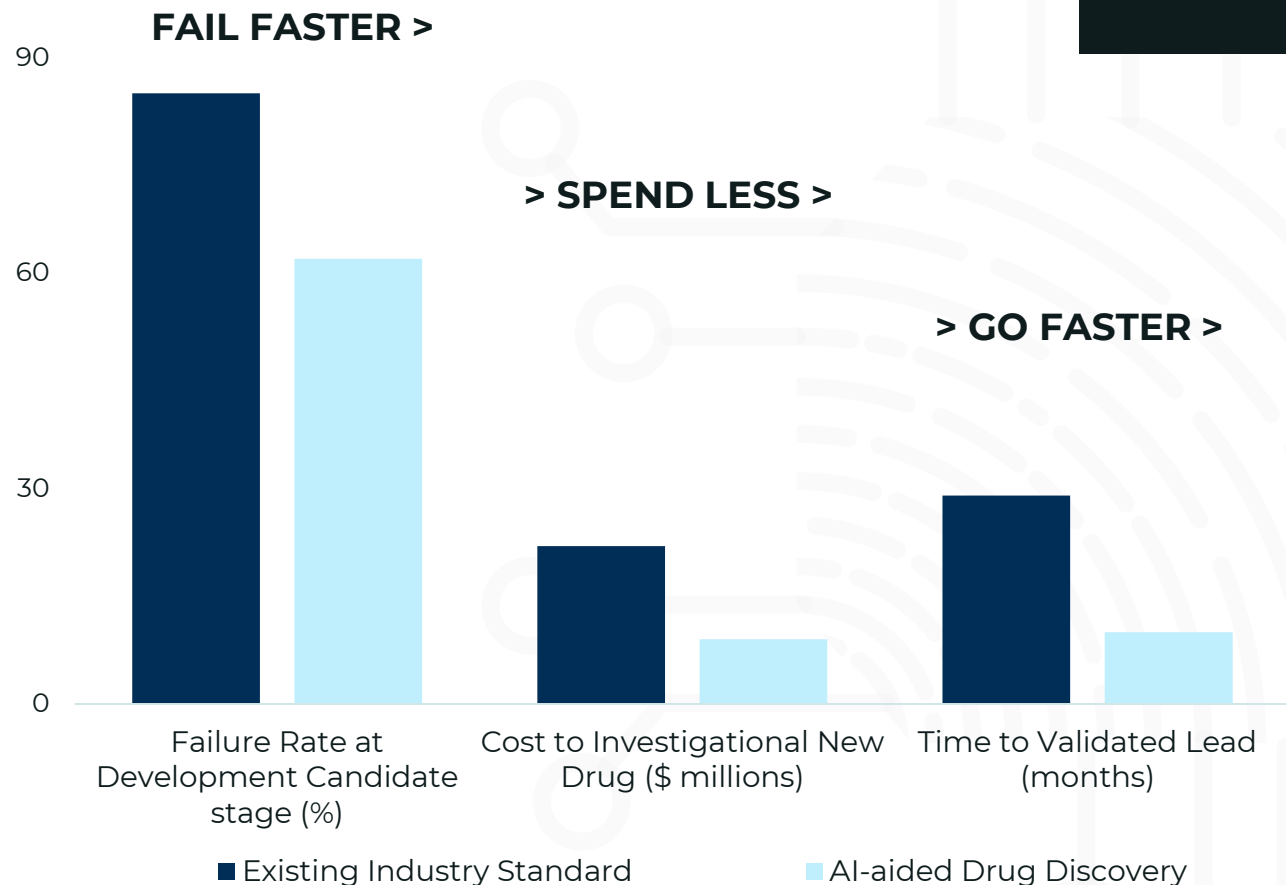
Source: Thematics AM,

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INVESTMENT OPPORTUNITY

Use Case : *In Silico* research



Source: ThematicsAM, Recursion Pharmaceuticals as at 30.06.2023

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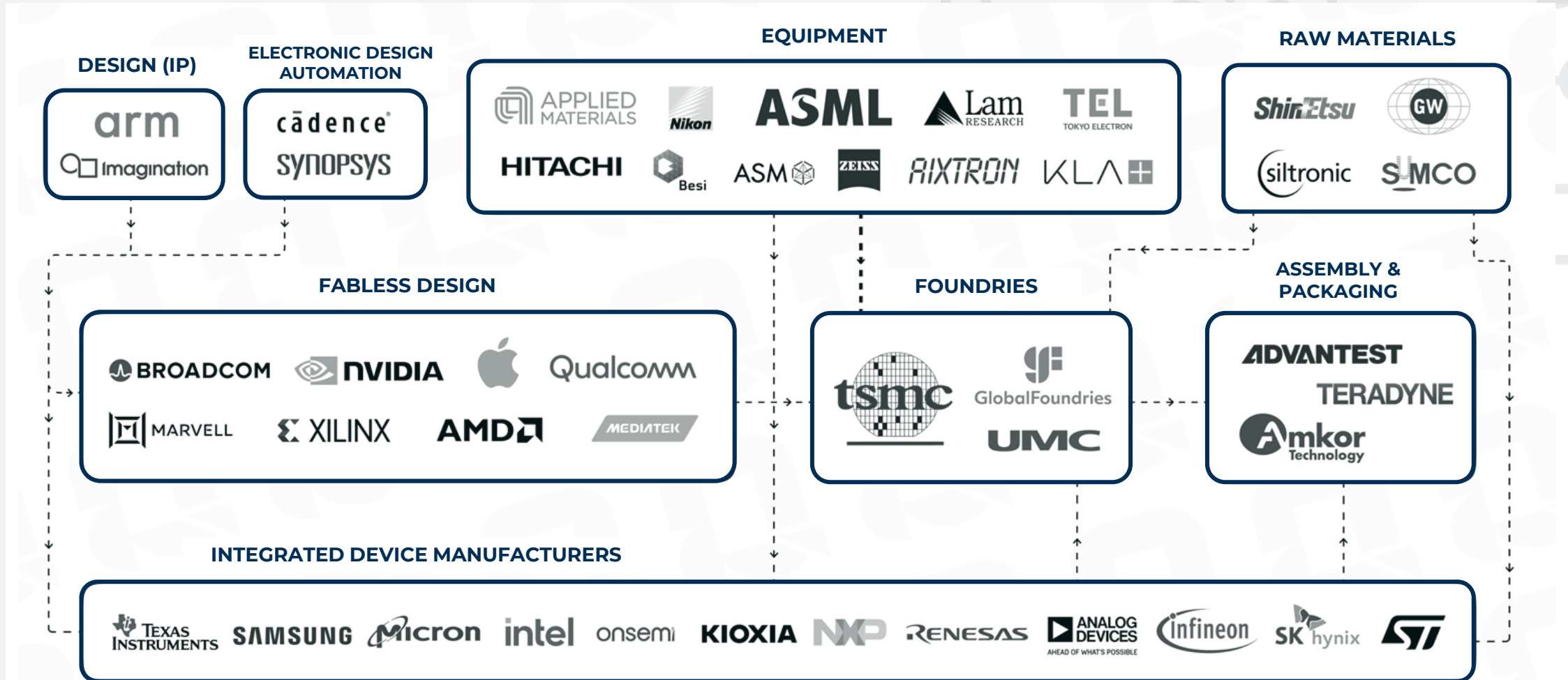
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THANK YOU !



AN OVERVIEW OF THE AI LANDSCAPE

The Semiconductor Value Chain



Source: Thematics AM & Quatr.

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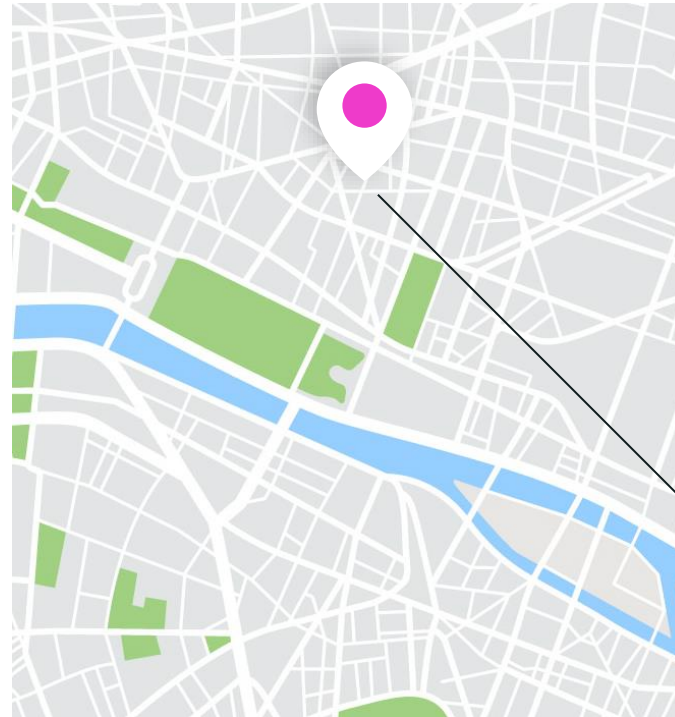
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