

# Artificial Intelligence in Pharma

Outsourcing in Clinical Trials DACH 2024

30 October 2024







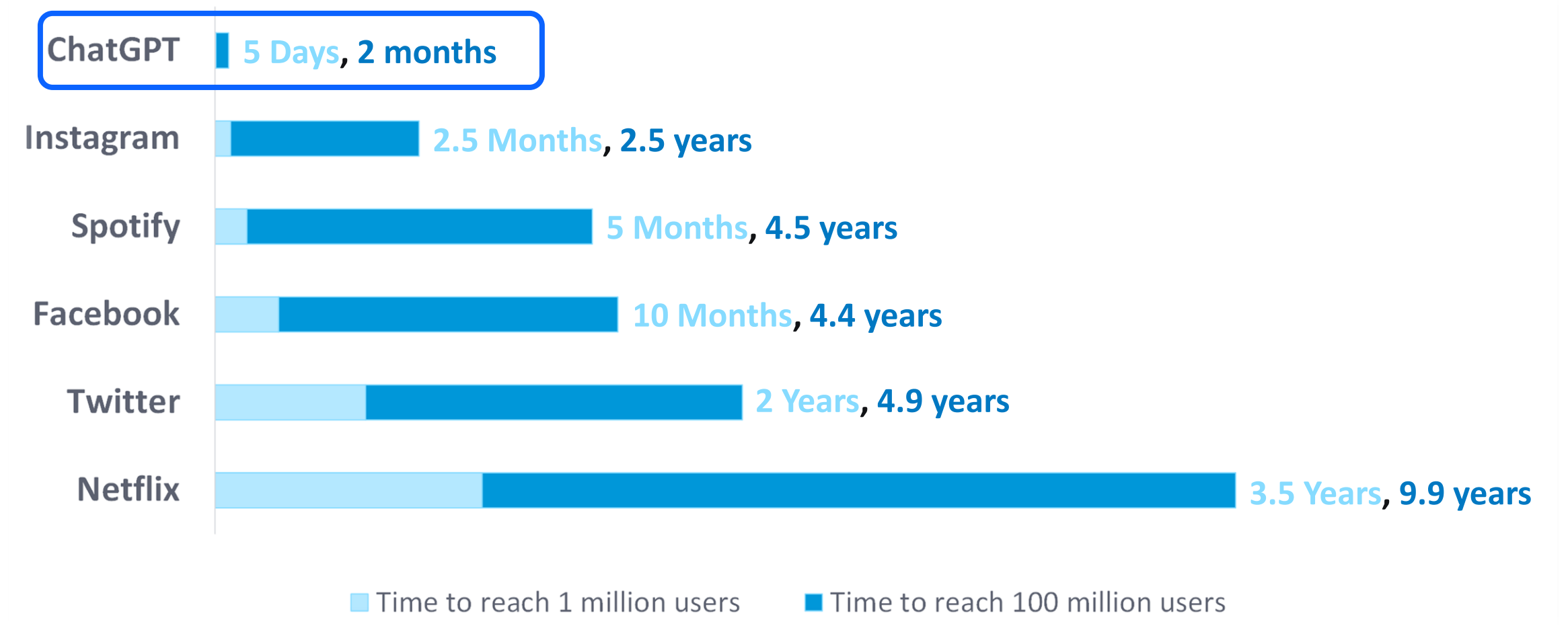
## Generative AI roadmap and latest developments



# Generative AI has grown faster than any other technology

Generative AI will upend and transform businesses across sectors with lasting impact

ChatGPT was the first to reach one million and 100 million users



Source: GlobalData

# Large language models (LLMs) can generate many types of content



## What is generative AI?

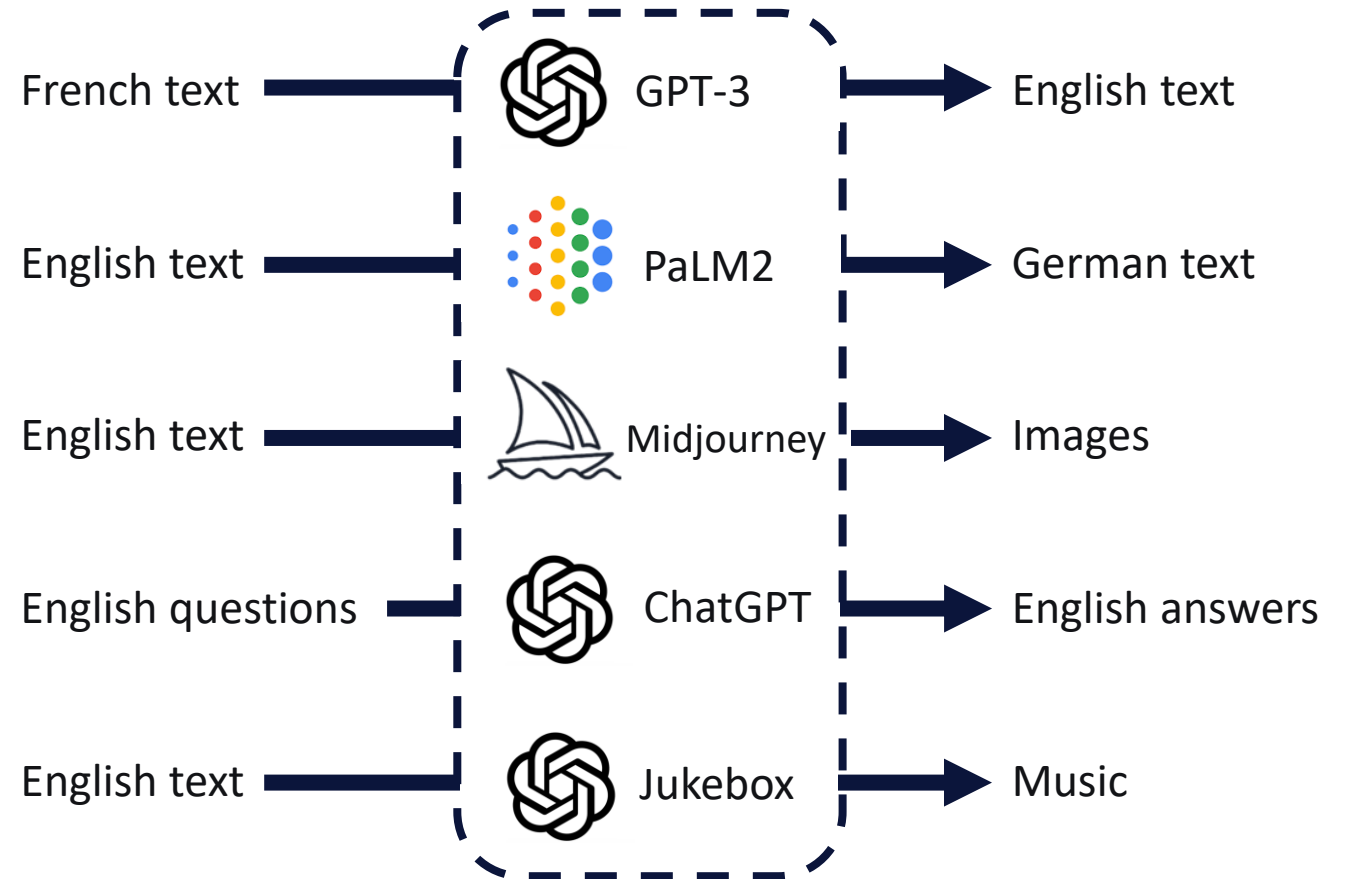
Generative AI refers to a category of artificial intelligence techniques and algorithms that are designed to generate new data or content that is similar to what it has been trained on. This can include text, images, videos, music, and other types of content. Examples of generative AI include image and video synthesis, text generation, music composition etc.

Neural networks can learn to 'translate' from language A to language B. However, the definition of 'language' is quite flexible.

As such, LLMs are applicable to many scenarios including:

- Translation
- Conversation
- Visual generation
- Music generation

AI practitioners use the term 'sequence transduction' instead.





# Significant open questions indicate that generative AI has an unclear roadmap

The outcome of these questions will determine the long-term impact on businesses investment decisions

Open question	Optimistic camp	Pessimistic camp
<b>Can LLMs' problems with hallucinations<sup>(1)</sup> and factual accuracy be resolved?</b>	Ilya Sutskever, OpenAI's Chief Scientist and one of the creators of ChatGPT, is confident that the problem will disappear with time as LLMs learn to anchor their responses in reality. OpenAI are using reinforcement learning with human feedback (RLHF).	Yann LeCun, Meta's Chief AI Scientist points out that: 1) LLMs have no idea of the underlying reality that language describes 2) Most human knowledge is nonlinguistic  By design LLMs' only objective is just satisfying statistical consistency with the prompt.
<b>Will scaling up LLMs lead to artificial general intelligence (AGI)?</b>	With further scaling of LLMs, there will be increasingly more 'emerging abilities', until eventually LLMs will be as intelligent as a human. This is arguably a sort of 'evolutionary paradigm'.	As entrancing as an "LLM evolution towards AGI" sounds, we have very limited knowledge of how new LLM abilities 'emerge' with scale, how accurate they are, and how to improve their accuracy or quality. Rather than an evolutionary paradigm, this is a brute-force approach.
<b>Will the environmental costs of LLMs be alleviated over time?</b>	Improvements in AI chips and software algorithms will reduce the energy cost of training large LLMs.	Given the trend of increasing the size of LLMs to improve accuracy and potentially trigger 'emerging abilities', it is unlikely the semiconductor industry will be able to keep up with the increasing computational demands, so energy consumption will grow exponentially.
<b>Are LLMs the best tool for all advanced AI capabilities, or do we need other paradigms?</b>	As new abilities such as advanced maths, logic, understanding of the world, planning, and even sentience and a conscience emerge, LLMs will be able to show all the advanced AI capabilities.	Given the limitations of LLMs with accuracy and hallucinations, and the lack of control over 'emerging abilities', new models and tools will be required to deal with advanced AI capabilities such as reliable decision-making, planning, and sentience.

(1) Hallucinations, a term coined by Google researchers in 2018, refers to a disturbing behavior in LLMs whereby they produce "highly pathological translations that are completely untethered from the source material".

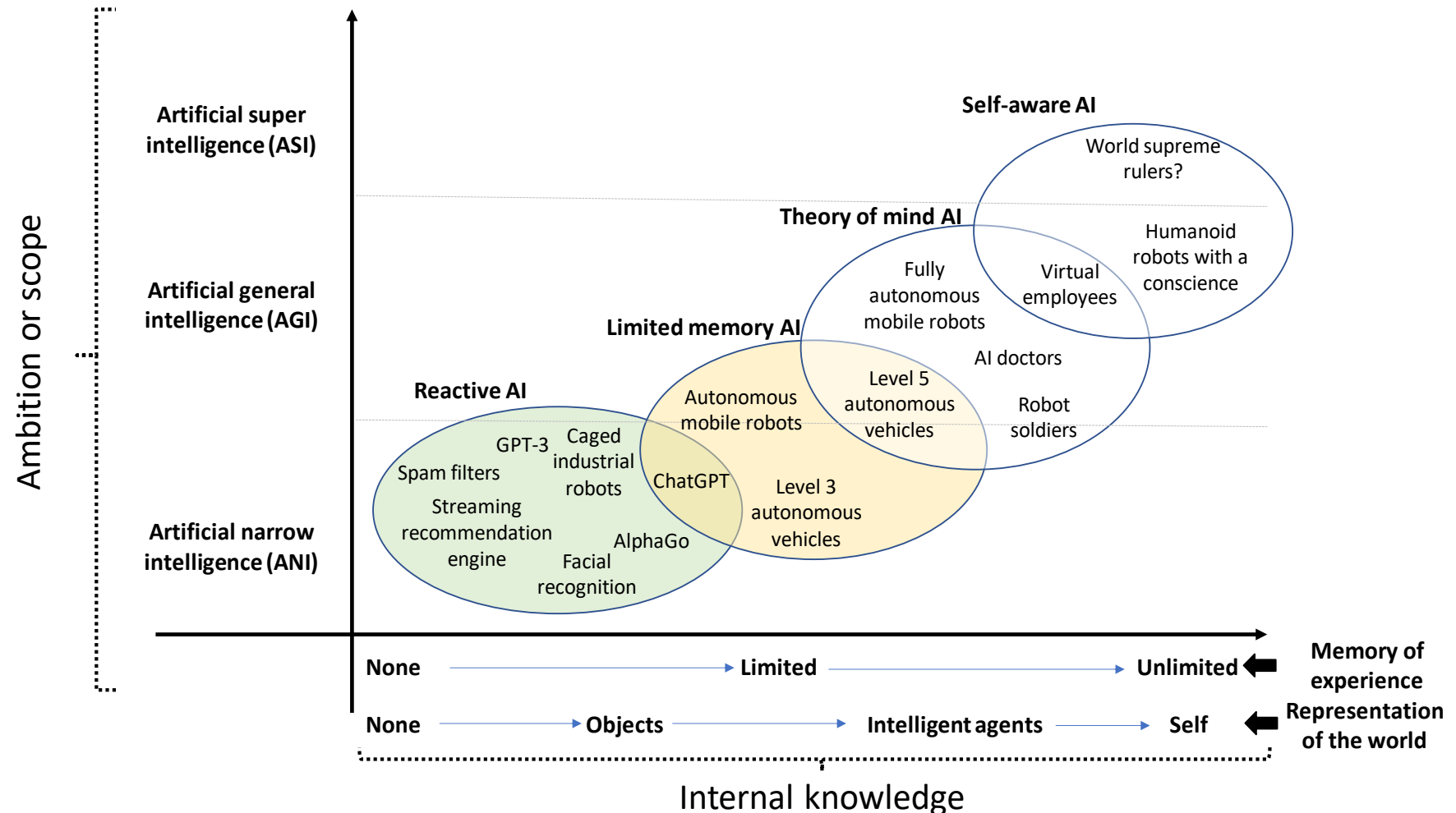
# The AI roadmap

We are entering limited memory AI

Despite the recent progress in the use of AI in real-world situations, such as facial recognition, virtual assistants, and (to a certain extent) autonomous vehicles (AVs), we are still in the early stages of the AI roadmap.

To understand the different types of AI, we look at two dimensions: the information the system holds and relies upon to make its decisions, and the capabilities of AI scope.

- ❖ Reactive AI
- ❖ Limited memory AI
- ❖ Theory of mind AI
- ❖ Self-aware AI

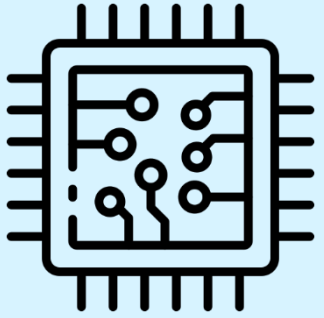




# Full AI value chain



At GlobalData we cover everything in the AI value chain, from semiconductors to application software



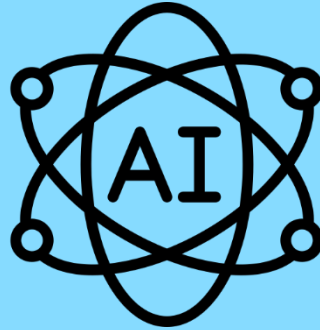
## Hardware

- Semiconductors
- Cameras
- Sensors and lasers
- Servers
- Storage devices
- Networking equipment
- Edge equipment



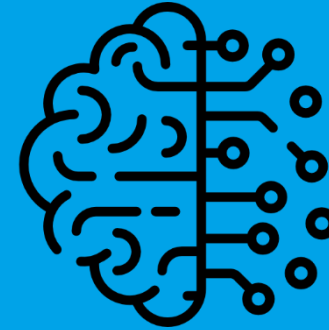
## Data management

- Data governance and security
- Data storage
- Data processing
- Data aggregation
- Data integration



## Foundation AI

- Data science
- Machine learning
- 3D modelling
- Knowledge representation and reasoning
- Visualization engines



## Advanced AI Capabilities

- Human-AI interaction
- Decision-making
- Motion
- **Creation**
- Sentience



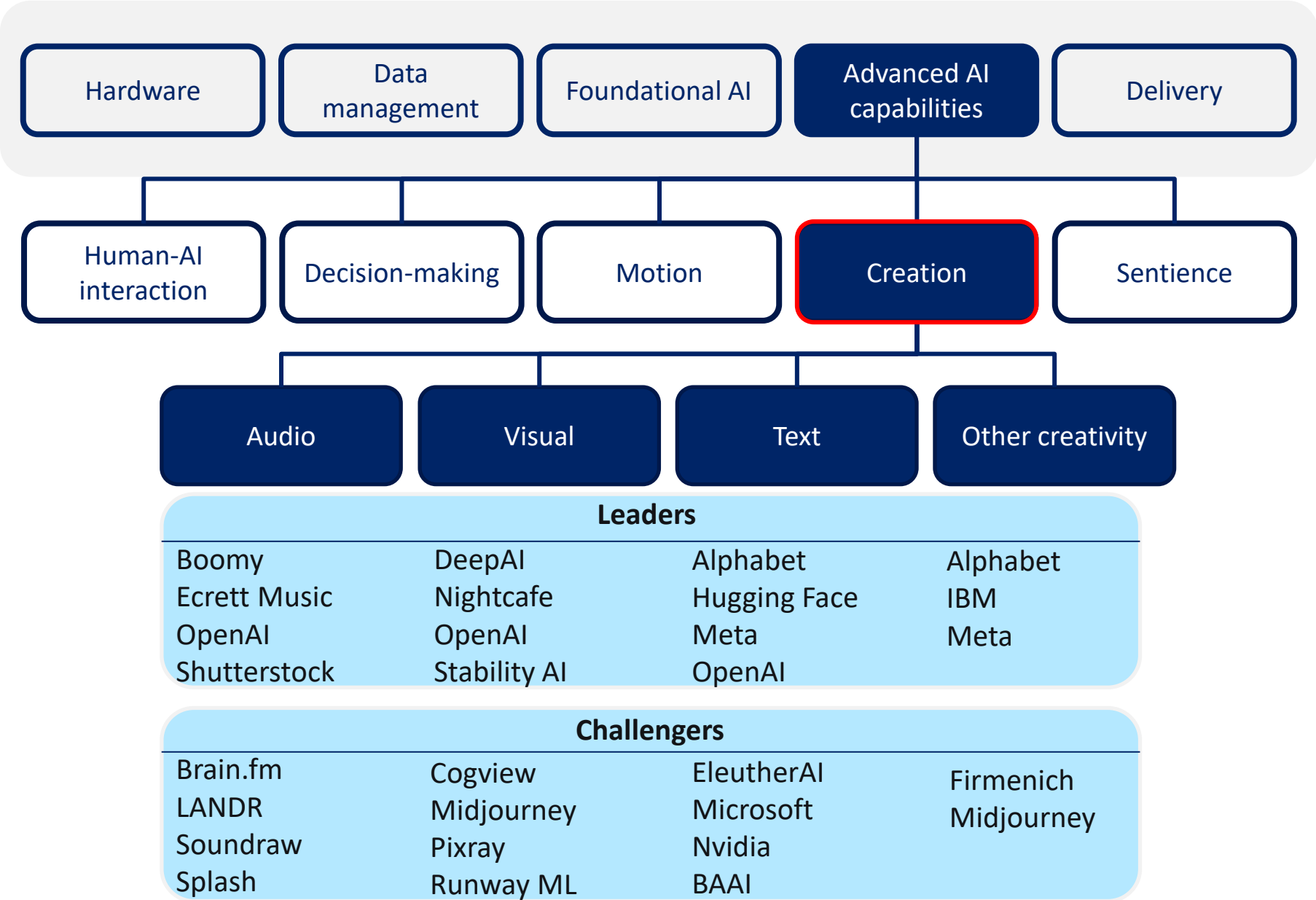
## Delivery

- Hardware appliance
- Licensed software
- Artificial intelligence as a service (AlaaS)





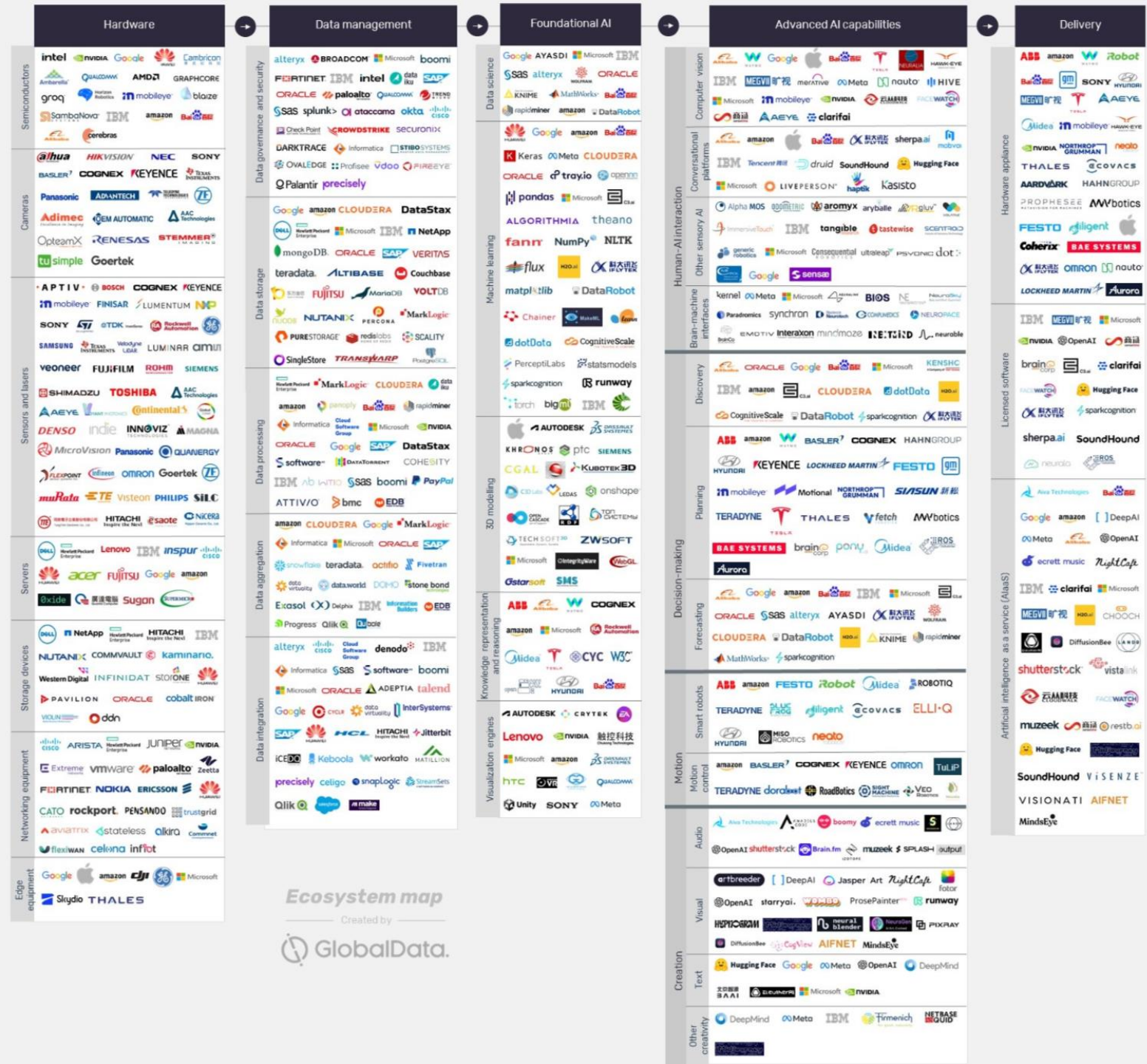
# Where does generative AI (or creation) fall within the AI value chain?



# AI ecosystem map

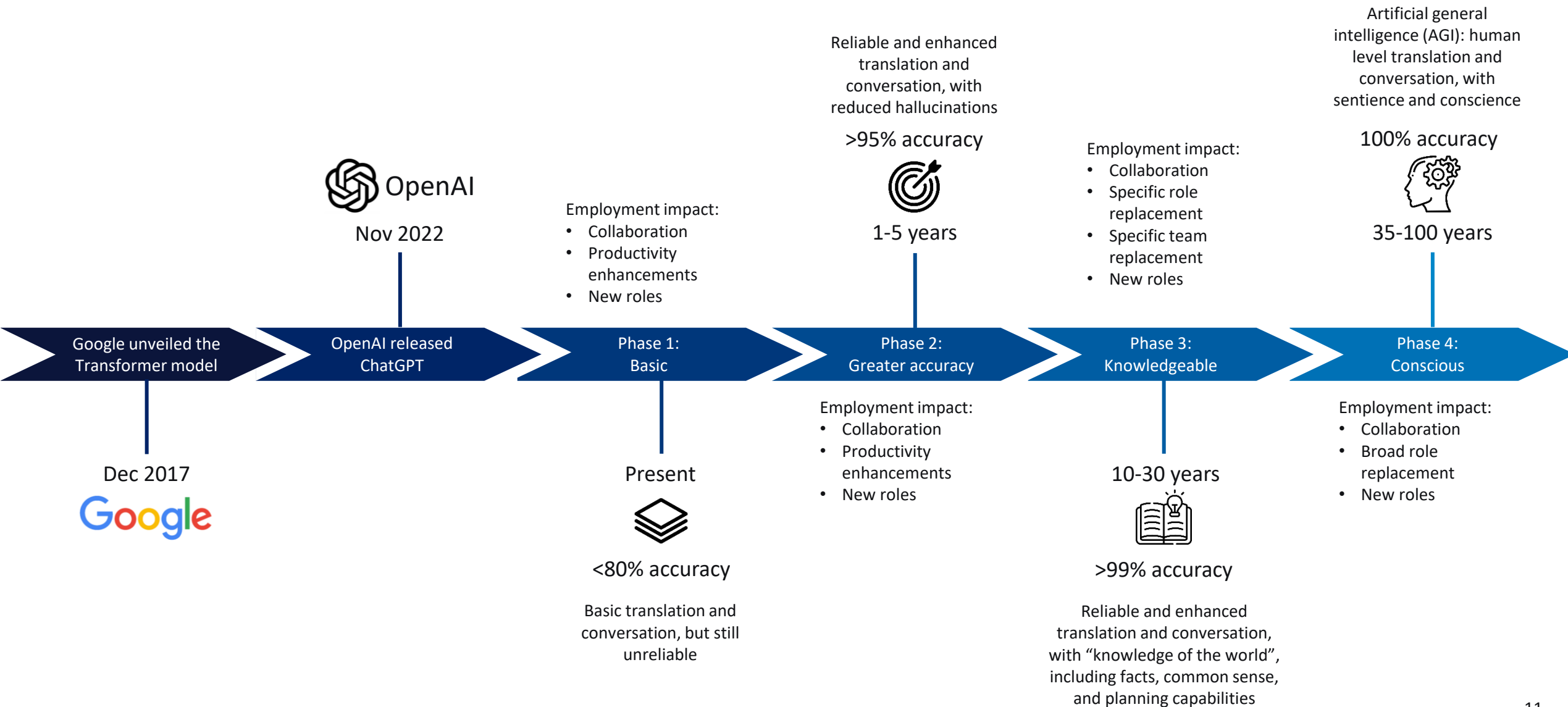
## Which tech vendors can help you?

The GlobalData AI ecosystem map identifies leading companies across the thematic value chain. This can be browsed in further detail on the **AI theme page** on GlobalData intelligence centers.





# Key phases in the development of generative AI

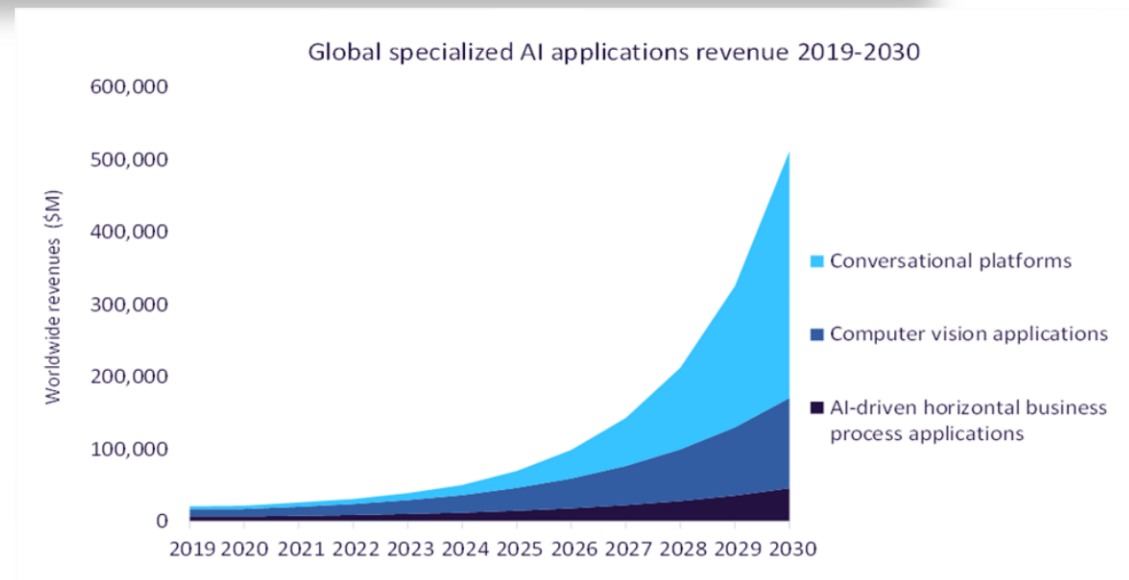
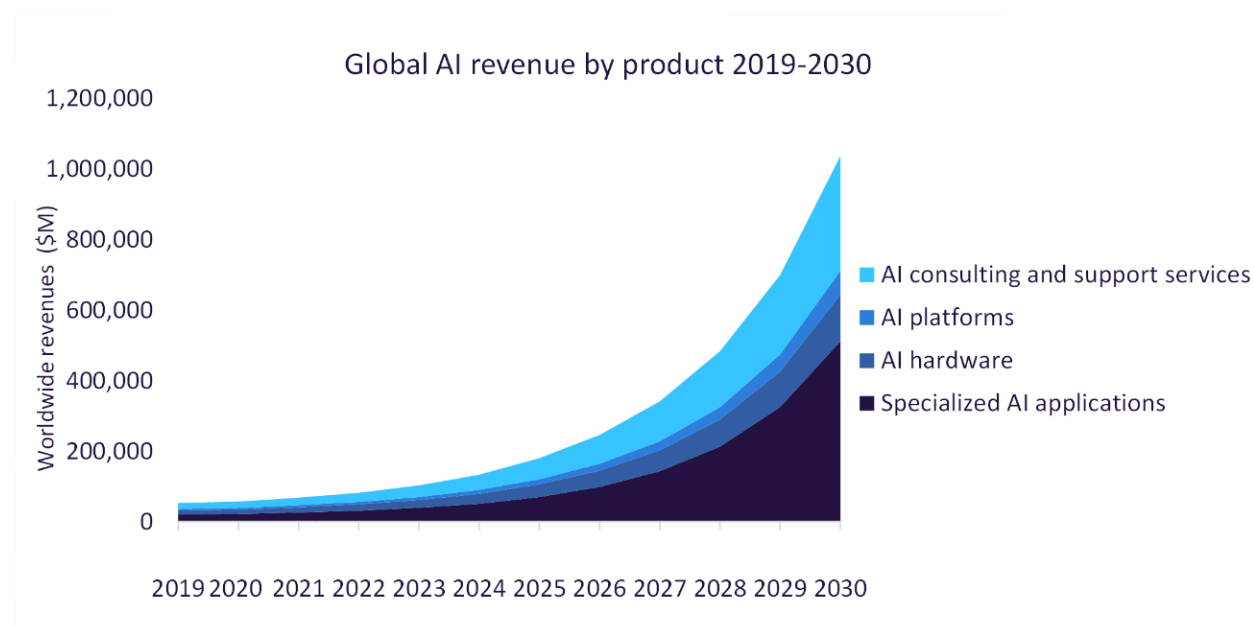




# We expect the AI market to grow from \$103B in 2023 to \$1,037B by 2030

- Recent progress in machine learning (ML) on the back of improved algorithms and increasing computing power has made it possible for AI to solve real-life problems.
- GlobalData estimates the total AI market will be worth \$1,037 billion in 2030.
- Within that, the global specialized AI applications market will be worth \$512 billion in 2030, up from \$39 billion in 2023.
- In the early years AI investments will be dominated by computer vision and conversational platforms

Source: GlobalData

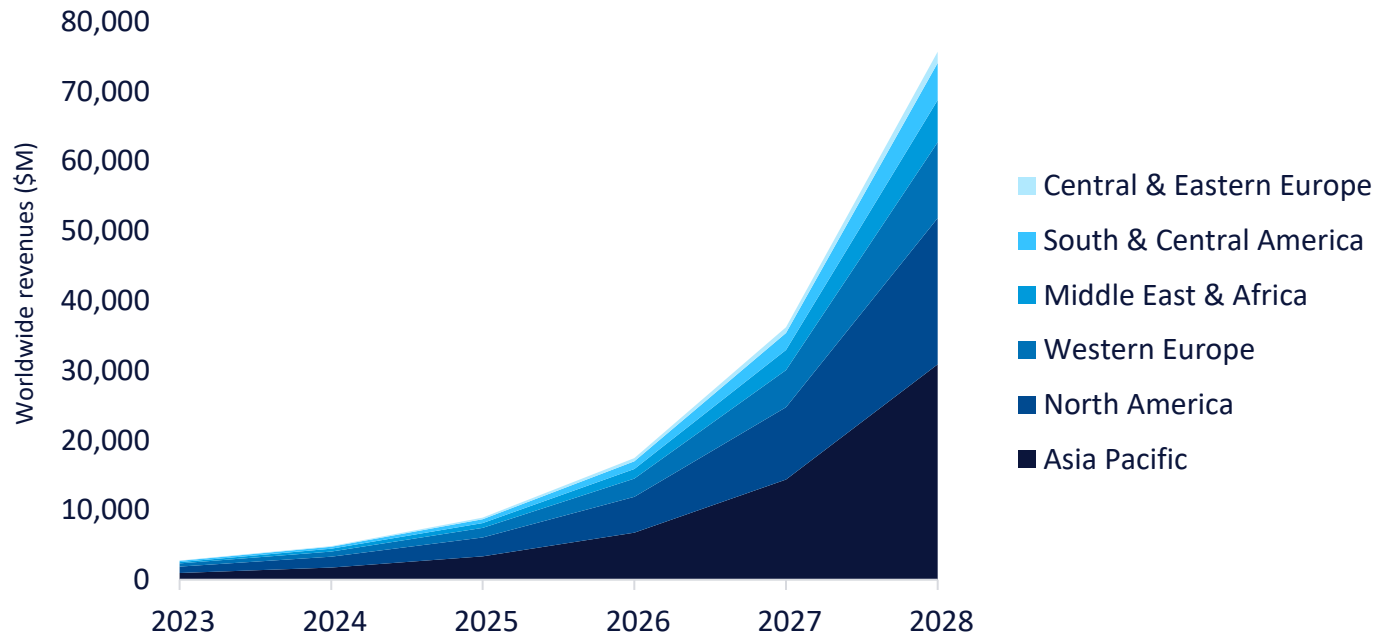




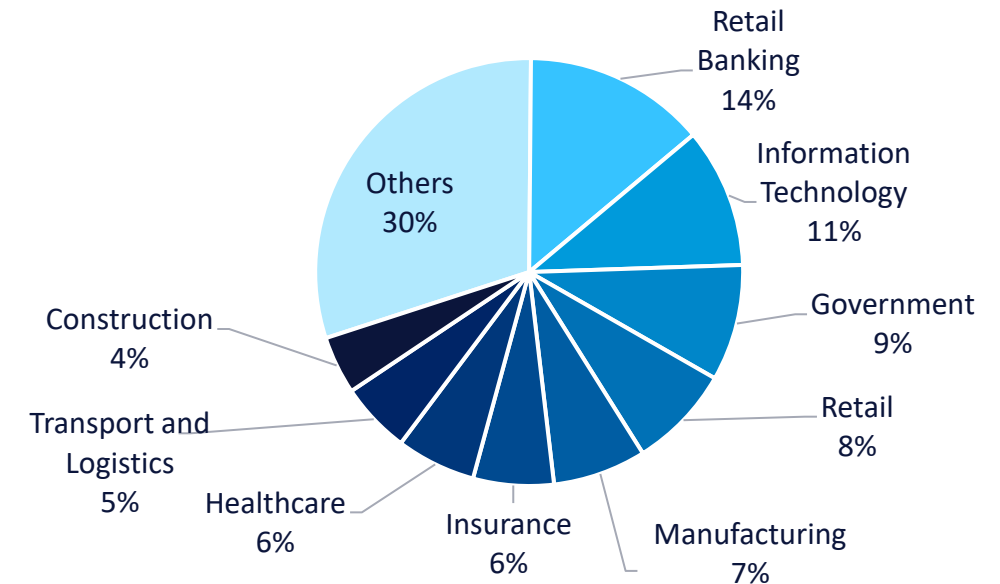
# Generative AI forecast by region and vertical

- GlobalData estimates that the global generative AI market specifically will be worth \$75.7 billion in 2028.
- It is expected to grow at a 94% CAGR from 2023 to 2028.
- Early adopting verticals will be IT, retail banking, government, manufacturing, retail, and healthcare.

Global Generative AI revenue 2023-2028



Generative AI by Vertical 2028

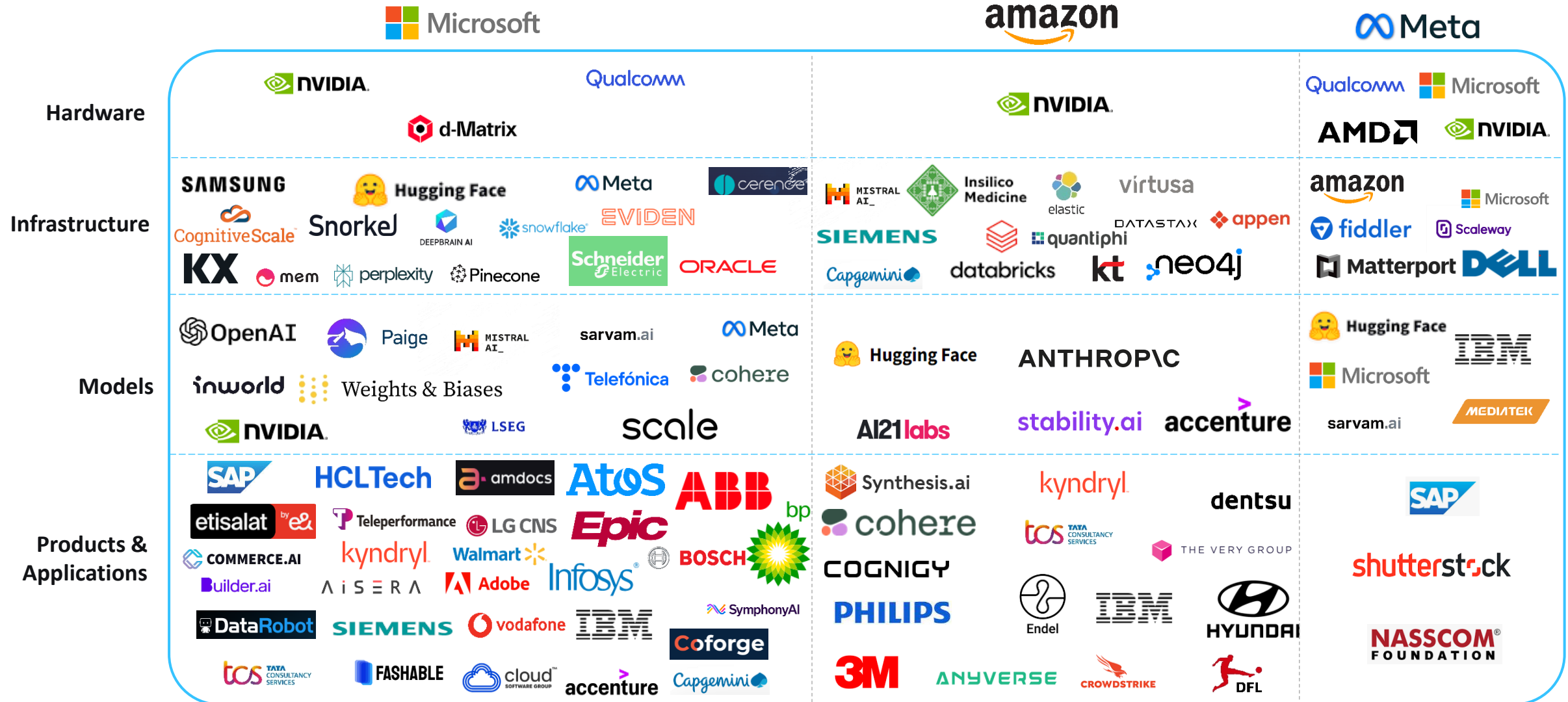






# GenAI stack for Big Tech is already significant (1 of 2)

Big Tech complements their GenAI tech stack presence through strategic alliances, predominantly with start-ups and a few within them





# GenAI stack for Big Tech is already significant (2 of 2)

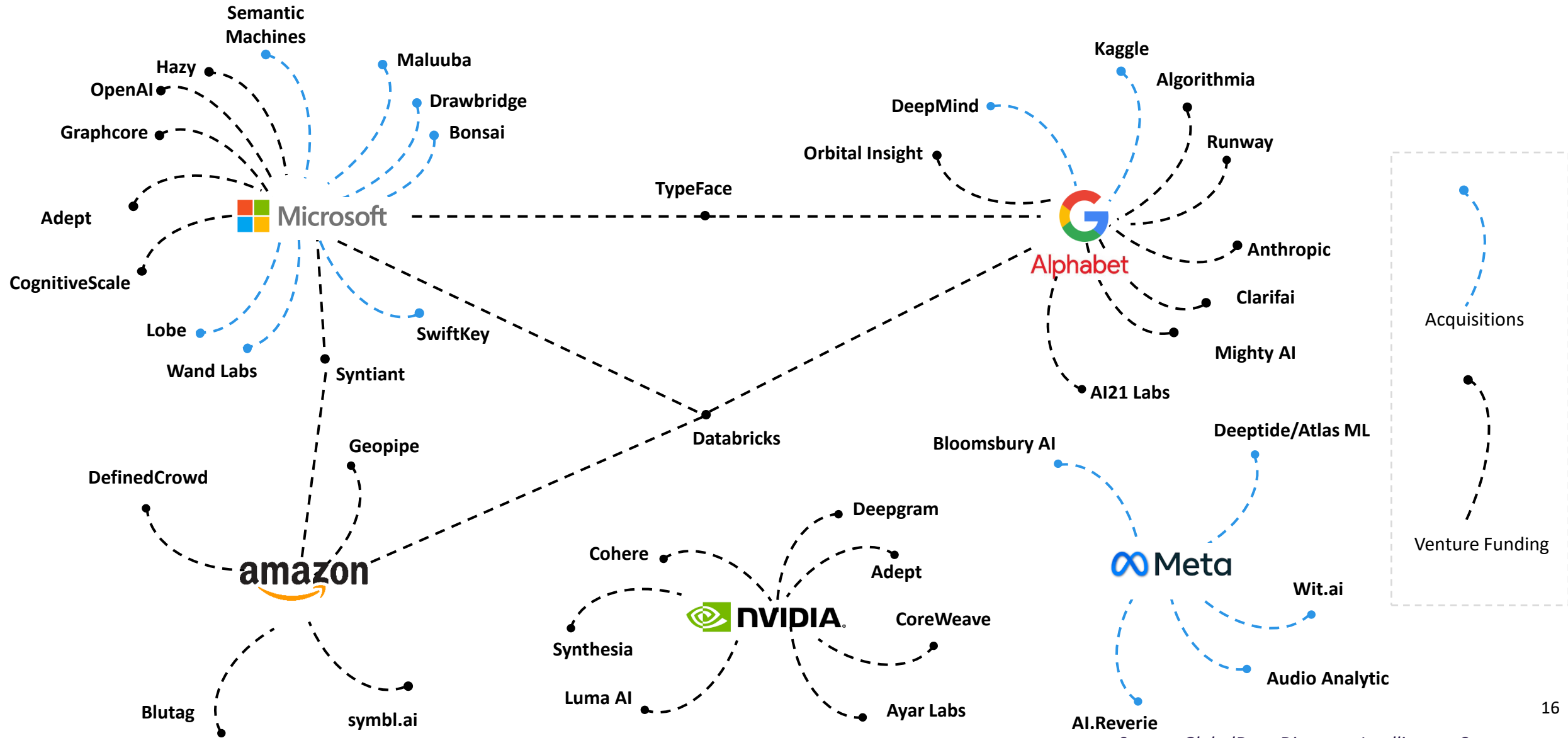
Big Tech complements their GenAI tech stack presence through strategic alliances, predominantly with start-ups and a few within them





# Key corporate venture capital investments and acquisitions

MAGMA, particularly Google and Microsoft, are highly active in funding startups and acquiring companies with GenAI capabilities.



Source: GlobalData Disruptor Intelligence Center

## Latest developments



The market impact of **small language models (SLMs)** is expected to be high. SLMs are being trained on smaller datasets for domain-specific applications. Benefitting from faster training times, lower carbon footprint, and improved security, SLMs could prove more attractive for enterprises compared to large language models (LLMs).



The adoption of **retrieval-augmented generation (RAG) techniques**, whereby businesses can augment LLM prompts and responses with information from reliable internal or external sources, enabling them to access a wide range of data repositories without the need to run expensive models re-training.



The growing need for **synthetic data generation** as increasingly larger generative AI models need vast amounts of data, possibly beyond what is currently being generated.

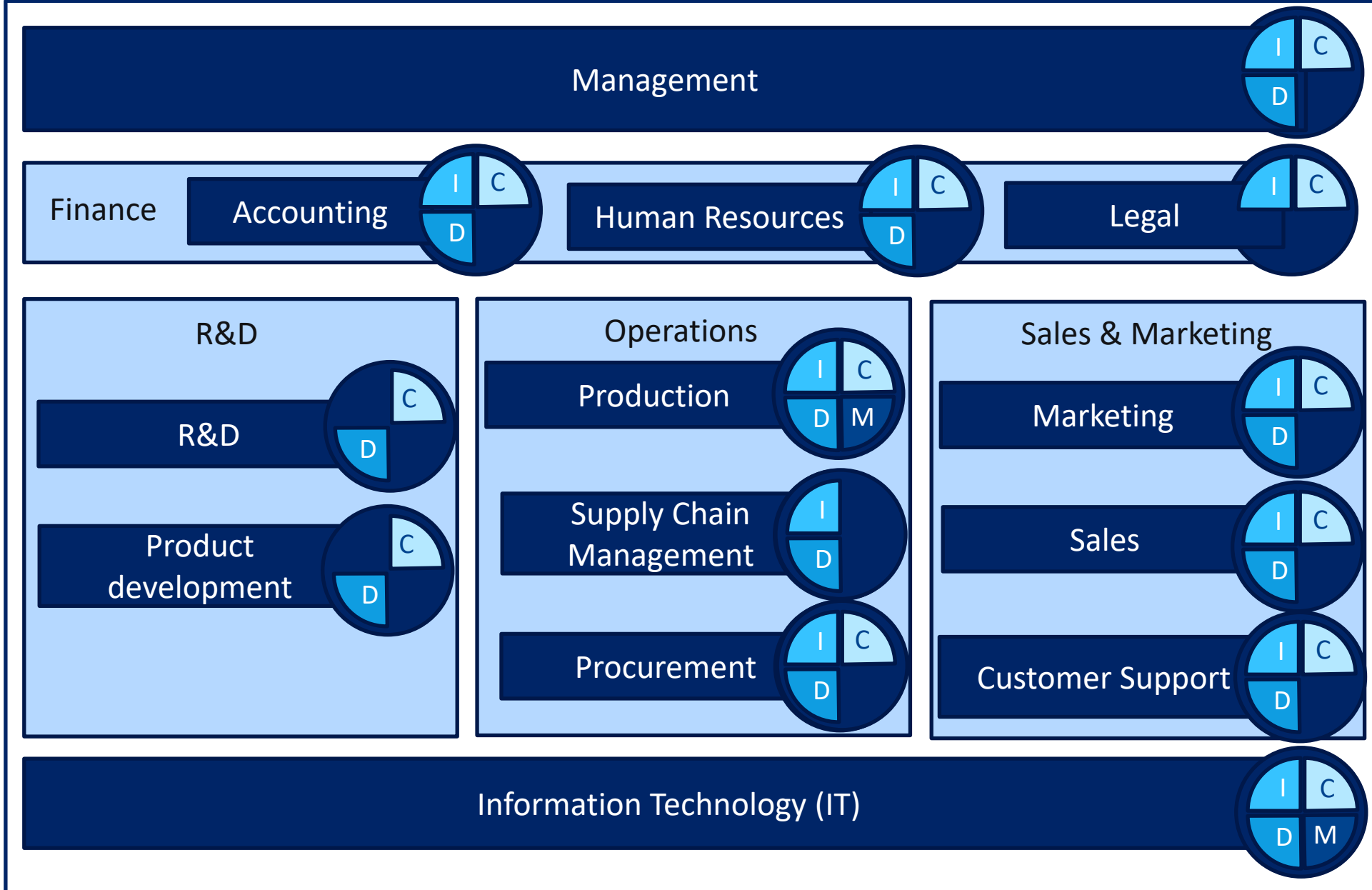


Greater focus on **AI governance and regulation**. There is a lack of global governance standards for AI and the EU has produced the most advanced framework so far, with the **EU AI Act** which came into force this year.

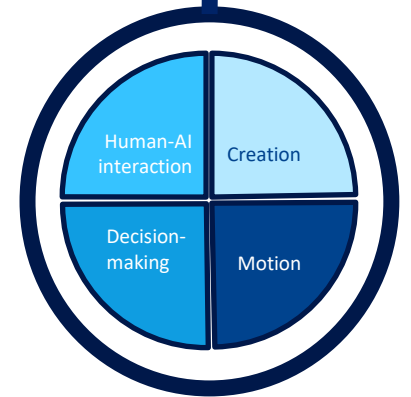


Business impact and use cases

# AI disruption across business processes



The four key types of advanced AI capabilities will be deployed unevenly and at different times across the enterprise business processes



# Generative AI business process use cases



## Customer support



One AI Rolls Out Generative AI Solution for CRMs

- An AI solution for customer relationship management.
- The solution offers multilingual capabilities and sentimental analysis that can increase customer satisfaction, generate insights, save time, strengthen data integrity, and automate processes.

## Production



Hortiya Brings PlantGPT to Food Production Industry

- It has adapted large language models (LLMs) that power GPT-4 for use in the food production industry.
- The model can understand how various inputs and environmental conditions impact a plant's internal systems and growth.
- It aims to give growers more control over the use of costly resources like electric light and fertilizers, increasing energy efficiency in food production.

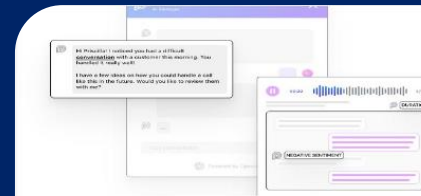
## Operations



EOT Launches Generative AI for Industrial Edge

- Generative AI can assist industries in creating and testing predictive maintenance models.
- This involves processing data in real-time and detecting potential equipment failures before they occur.
- This can improve overall operational efficiency by reducing downtime and optimizing maintenance schedules.

## Management



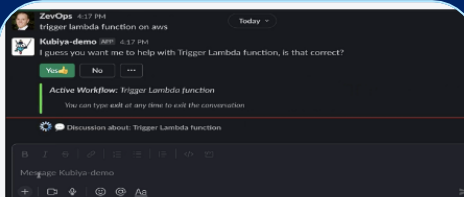
Pathlight Rolls Out Generative AI Autonomous Manager

- An AI manager utilizes LLMs to handle management analysis, allowing human managers to focus on leading and supporting their teams.
- It analyses performance data such as customer interactions and employee KPIs to offer helpful insights and provide objective coaching in real time.

# Generative AI business process use cases



## Product development



Kubiya Develops Generative AI Solution for DevOps

- The solution allows users to interact in a common language and simplify complex tasks into easy conversations.
- It allows developers to create and manage automation, workflows, and knowledge assets.
- The solution streamlines access to development operations (DevOps) functions and can respond to queries from technical documentation and knowledge management platforms like Notion and Confluence.

## IT



SentinelOne Introduces Generative AI-Powered Threat-Hunting Platform

- The platform can generate and examine a variety of threats.
- Generative AI improves the company's threat-hunting capabilities by allowing the platform to create and analyze multiple variations of threats, even those never seen before.
- This can enhance detection rates and reduce false positives, ultimately improving overall security.

## Marketing



CleverTap Launches AI-Based Content Creation Platform

- This solution creates personalized marketing messages for brands.
- It analyses customer behavior and creates customized marketing messages that are relevant to each customer.
- The tailored messages to each customer increase the likelihood of engagement and conversion.

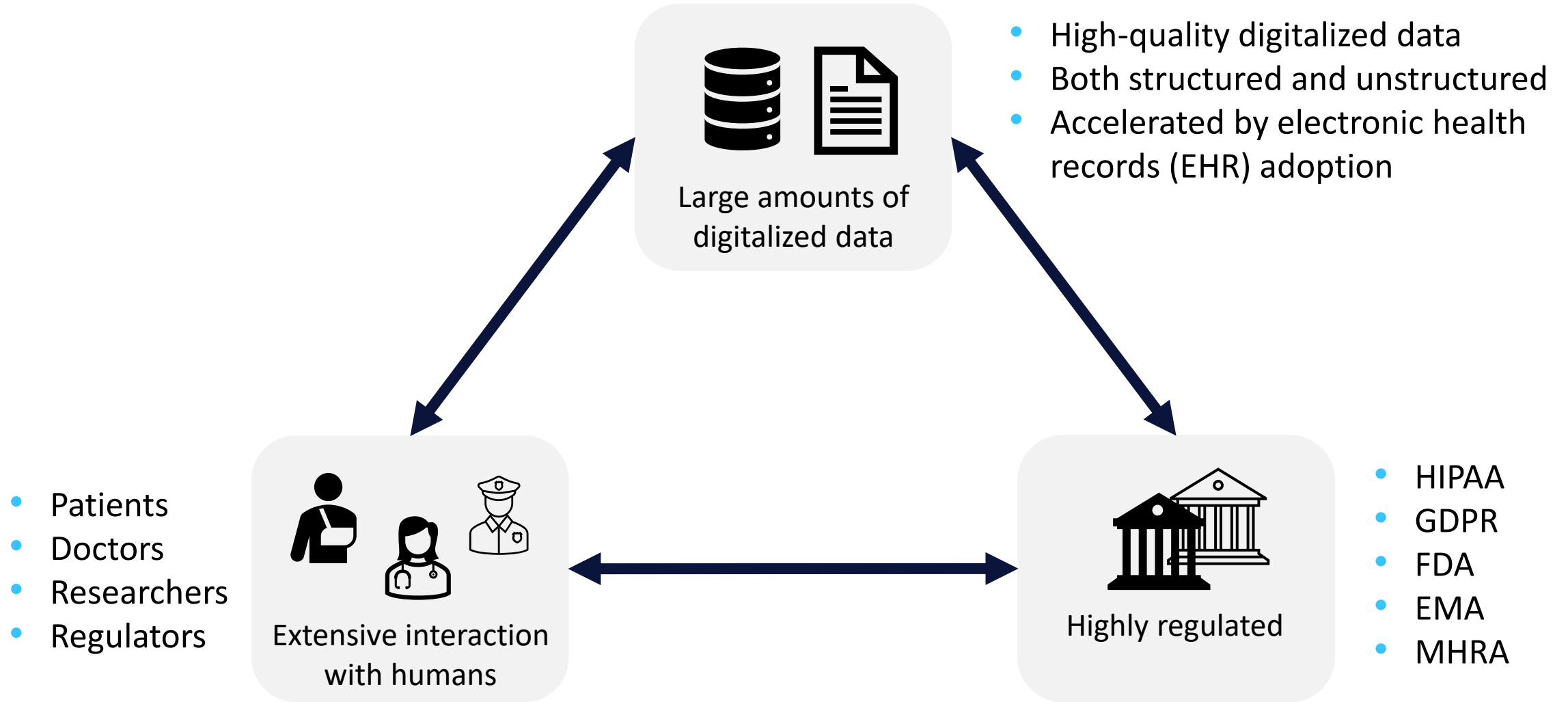
## Sales



One AI Launches Generative AI Solution for Business Needs

- The solution is applicable for various business use cases, such as generating personalized emails, social media messages, and follow-up tasks.
- It includes language skills, language analytics, and audio intelligence, to process and analyze text, monitor language generation, and convert audio or video into structured data.

# Why is generative AI important to the life sciences industry?





# AI's impact across the Lifesciences industry

## Healthcare data management

Medical data collection, storage retrieval, and analytics



## Manage and engage patients

Enhance physician experience with intelligent patient follow-up



## Diagnosis and patient care

Identify high-risk patients and provide at-home care



## Sales and marketing

Call tracking and personalized advertisements



## Privacy and security concerns

Ensure that healthcare data are secure without any breach of information



## Control and manage costs

Allow health plans to collect and analyze volumes of data that could lead to customized care programs



## Medical treatments

Select the optimal treatment plan for a patient



## Target identification

Expedite target identification and easily identify targets by analyzing data from multiple sources



# Vertical deep dive example – Pharma

## Research

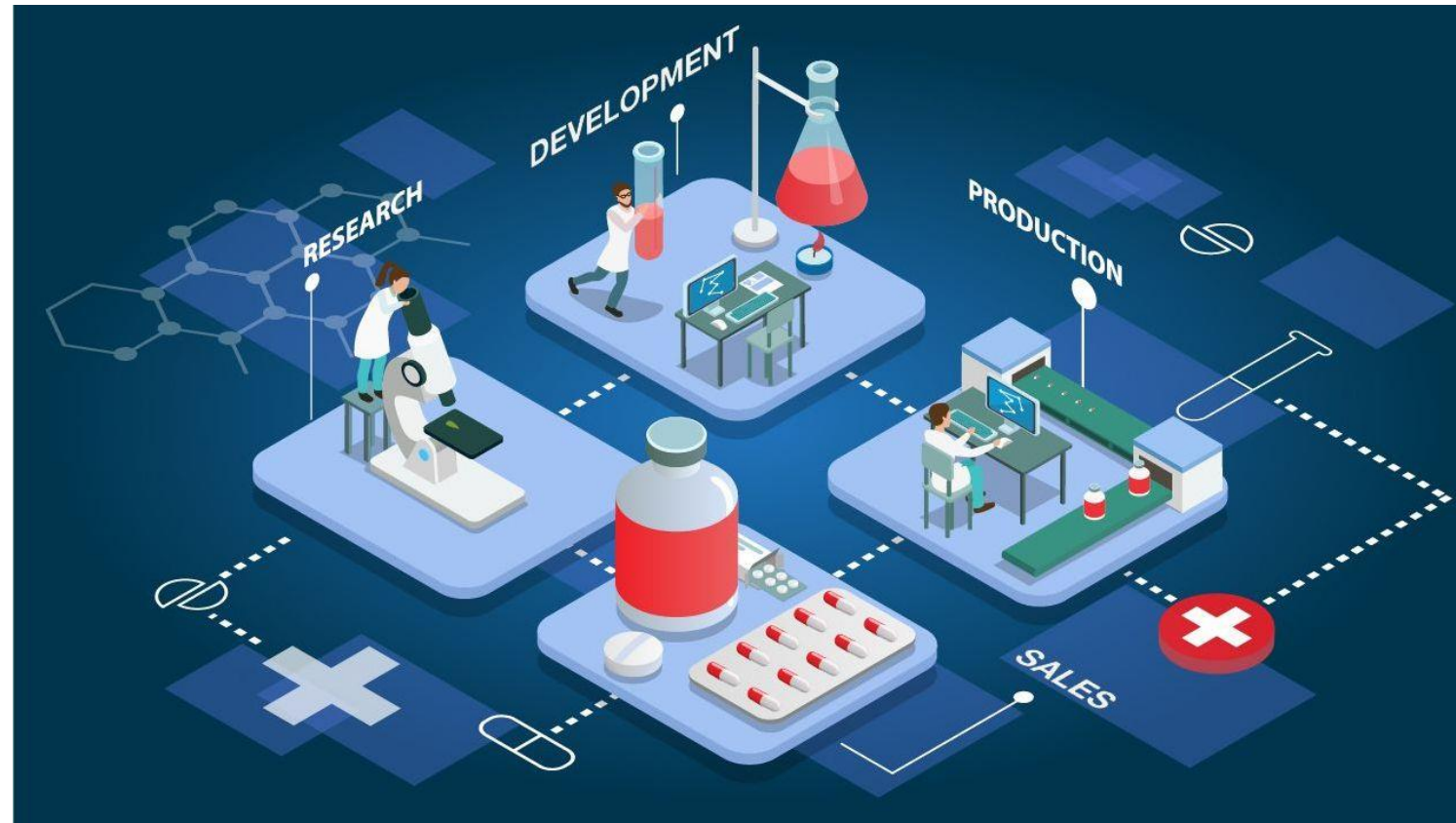
- Molecular research
- Drug discovery
- Epidemiological surveillance
- Digitalisation of historical data

## Drug development

- identify therapeutic targets
- Predict pharmacological properties of candidate compounds
- Optimize dosing regimens
- Predicting potential side effects

## Clinical research

- Clinical data analytics
- Automate eligible participant selection
- Automation of study protocol generation
- Automate manual administrative tasks
- Digitalisation of historical data



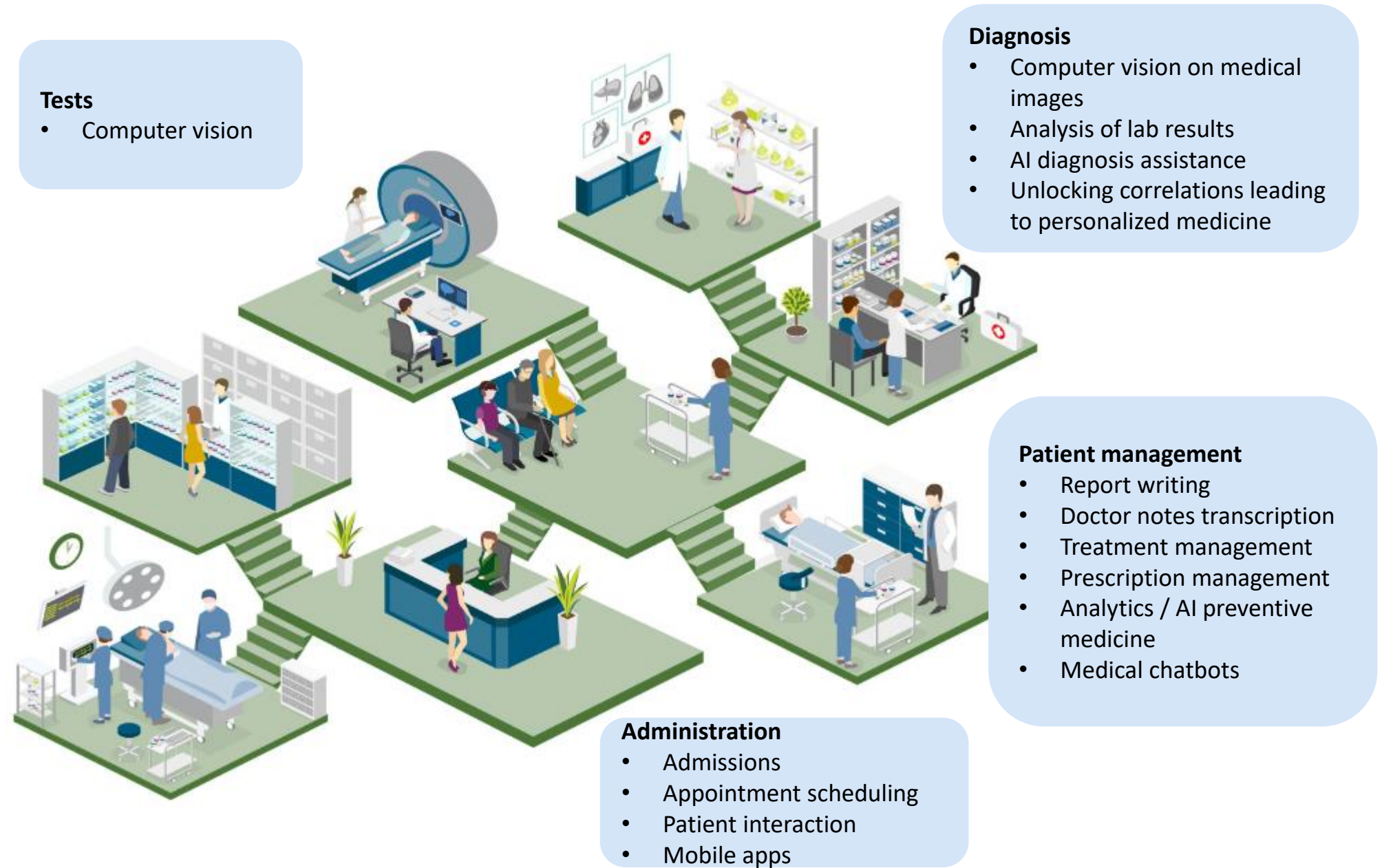
## Sales

- Automate production of marketing materials
- Prospect interaction
- Contract drafting

## Production

- Manufacturing automation
- Automatic inspection
- Robot guidance
- Predict and identify quality control issues
- Suggest corrective actions to minimize disruption and improve product distribution

# Vertical deep dive example – Healthcare organisations





# Vertical deep dive example – Primary Care organizations

## Digital Presence

- Content generation to attract new clients
- SEO optimization
- Translation

## Diagnosis

- Detection of conditions (e.g. heart failure, cancer)
- Symptom recognition AI
- Earlier diagnosis
- Increased sensitivity and specificity
- Less invasive
- Cost effective

## eConsultations

- Triage patients remotely
- Real-time data
- Automate GP e-consultation requests
- Reduce staff time
- Improve clinician efficiency

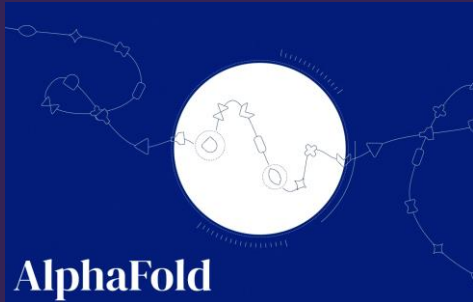
## Administration

- Predict missed appointments and offer alternatives
- Maximize efficiency



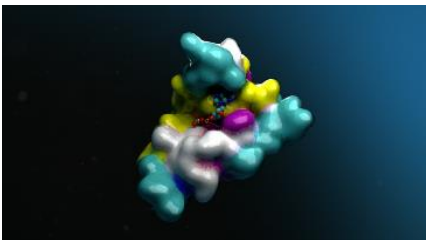
## Generative AI - Examples – Life sciences

### AlphaFold



- AlphaFold is a protein structure prediction system that uses a deep learning model to predict the 3D structure of a protein from its amino acid sequence.
- AlphaFold has already been used to make significant advances in biology, such as predicting the structure of the SARS-CoV-2 spike protein, which is the protein that the virus uses to enter cells.

### Nvidia BioNeMo Cloud service



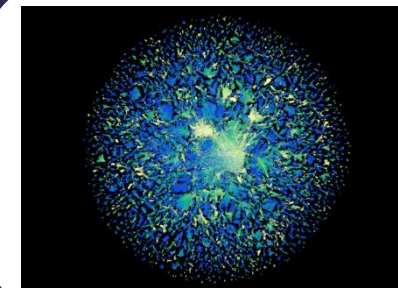
- NVIDIA BioNeMo Cloud service is a cloud-based platform that enables researchers to train and deploy large language models (LLMs) for drug discovery.
- LLMs are a type of artificial intelligence (AI) that can be trained on massive datasets to learn the relationships between different words and concepts.
- BioNeMo Cloud service provides a number of features that make it ideal for drug discovery.

### Med-PaLM2



- Med-PaLM2 is a large language model (LLM) from Google Research, designed for the medical domain.
- Med-PaLM2 was trained on a massive medical dataset, and can summarize insights from a variety of medical texts.
- Med-PaLM2 was the first large language model to perform at "expert" level on U.S. Medical Licensing Exam-style questions.

### ESM Metagenomic Atlas






- The ESM Metagenomic Atlas is a database of over 700 million predicted protein structures.
- The ESM Metagenomic Atlas was created by Meta AI using a machine learning model called ESMFold.
- The ESM Metagenomic Atlas can be used to identify new proteins, discover new drug targets, and study the evolution of proteins.

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Generative AI delivery models and adoption strategies




# Emerging generative AI delivery models for enterprise customers

Different delivery models are suitable for different use cases depending on training needs and data sensitivity

	Model	Pre-training execution	Trained image data	Additional domain specific training	Proprietary data access by AI supplier	Examples
<b>Hosted/SaaS</b> 	<ul style="list-style-type: none"><li>• Proprietary and hosted by AI supplier</li><li>• Subscription pay as you go</li></ul>	<ul style="list-style-type: none"><li>• Ran and paid by AI supplier</li></ul>	<ul style="list-style-type: none"><li>• Proprietary, undisclosed by AI supplier</li></ul>	<ul style="list-style-type: none"><li>• Ran via API on model hosted by AI supplier</li></ul>	<ul style="list-style-type: none"><li>• Unclear</li></ul>	<ul style="list-style-type: none"><li>• OpenAI</li><li>• Alphabet</li><li>• Anthropic</li><li>• Cohere AI</li></ul>
<b>Hybrid/licensed pre-training</b> 	<ul style="list-style-type: none"><li>• Proprietary but hosted by enterprise customer</li><li>• Model licensing</li></ul>	<ul style="list-style-type: none"><li>• Ran and paid by AI supplier</li></ul>	<ul style="list-style-type: none"><li>• Proprietary, licensed by AI supplier</li></ul>	<ul style="list-style-type: none"><li>• Ran locally by enterprise customer</li></ul>	<ul style="list-style-type: none"><li>• None</li></ul>	<ul style="list-style-type: none"><li>• Meta/LLaMa 2</li><li>• Falcon</li><li>• Dolly</li><li>• Guanaco</li><li>• Alpaca</li></ul>
<b>Organic/in-house</b> 	<ul style="list-style-type: none"><li>• Proprietary and hosted by enterprise customer</li></ul>	<ul style="list-style-type: none"><li>• Ran and paid by enterprise customer</li></ul>	<ul style="list-style-type: none"><li>• Proprietary of enterprise customer</li></ul>	<ul style="list-style-type: none"><li>• Ran locally by enterprise customer</li></ul>	<ul style="list-style-type: none"><li>• None</li></ul>	<ul style="list-style-type: none"><li>• BloombergGPT</li></ul>



# How can companies acquire generative AI capabilities – Build, Partner or Buy?

<b>BUILD</b> 	<b>Pros</b> <ul style="list-style-type: none"><li>• Perfect fit to internal needs</li><li>• Source of competitive advantage</li><li>• Full IP ownership</li><li>• Can take advantage of economies of scale across the organisation</li></ul>	<b>Cons</b> <ul style="list-style-type: none"><li>• Slower time to market</li><li>• High organisational effort</li><li>• Higher risk of failure</li><li>• Lack of internal AI skills</li></ul>	<b>Examples</b> <ul style="list-style-type: none"><li>• Absci</li><li>• Insilico Medicine</li></ul>
<b>PARTNER</b> 	<b>Pros</b> <ul style="list-style-type: none"><li>• Faster time to market</li><li>• Lower risk of failure</li><li>• Less organisational effort</li><li>• Can take advantage of economies of scale across the organisation</li><li>• More suitable for drug discovery</li></ul>	<b>Cons</b> <ul style="list-style-type: none"><li>• Partial IP ownership</li><li>• Slower time to market</li><li>• More limited competitive advantage</li></ul>	<b>Examples</b> <ul style="list-style-type: none"><li>• Exscientia / Sumitomo Dainippon Pharma</li><li>• Benevolent AI / AstraZeneca</li><li>• Insilico / Fosun</li><li>• Insilico / Sanofi</li></ul>
<b>BUY</b> 	<b>Pros</b> <ul style="list-style-type: none"><li>• Fastest time to market</li><li>• Minimal risk of failure</li><li>• Minimal organisational effort</li><li>• More suitable for business process digitalisation</li></ul>	<b>Cons</b> <ul style="list-style-type: none"><li>• No perfect fit to internal needs</li><li>• Lack of economies of scale</li><li>• Likely most expensive option long term</li></ul>	<b>Examples</b> <ul style="list-style-type: none"><li>• Nuance / Oxford University Hospitals</li><li>• Nuance / Homerton University Hospital</li></ul>



# AI Governance



# Five key aspects need to be in place for society to see the full benefits of AI

Responsible AI means managing AI-related risks from an ethical and legal perspective



## Universal AI principles

Building blocks of future AI regulations and standards established by international organizations.



## Voluntary guidelines

Non-binding commitments showing a company's willingness to embrace future regulation.



## Standards and certifications

Technical protocols to implement responsible AI and certification programs to demonstrate adherence to ethical use of AI.



## Regulation

The legal framework, encompassing existing and upcoming laws on AI, for responsible AI.



## Compliance and enforcement

Organizations' alignment with AI principles, and regulators' investigations of potential violations of the law by AI systems.

# Regulation is underpinned by the legal frameworks in place to enforce responsible AI



Sweeping AI regulations are coming into force around the globe



- The **US** has a light-touch approach, emphasizing best practices and relying on different agencies to craft their own rules. It also takes a nuanced approach to regulating each sector of the economy differently.
- President Biden's executive order on AI introduces a risk-based approach, like the EU AI Act, but it is sector-based and highly distributed across federal agencies.
- The 2024 US presidential elections will influence the discussion around how to enact the Act and other AI laws.



- The **UK** is developing a principles-based framework for regulators to interpret and apply within their sector-specific domains.
- It has also begun to draft legislation to regulate AI, with an emphasis on limiting AI foundation models.



- The **EU** AI Act, which came into force in 2024, is the most advanced framework for AI regulation envisaged so far.
- It includes several restrictions on LLMs. Open-source AI companies are exempted from most of the AI Act's transparency requirements unless they are developing models that are computing-intensive.
- The Act will need provisions to implement guidelines.



- **China** was one of the first countries to roll out detailed AI regulations, i.e., on recommendation algorithms and generative AI models.
- A more comprehensive AI law is on the agenda, similar to the EU's AI Act.
- Chinese AI companies are already subject to plenty of regulations; for example, any large language model (LLM) must be registered with the government before it can be released to the Chinese public.



- **Japan** currently has no regulation restricting the use of AI, but it leans towards soft law and the US attitude.
- It sees AI as a tool to cope with the population decline that is causing labor shortages.



# The EU AI Act introduces stringent regulation for LLMs

These are defined as general-purpose AI (GPAI) models because they can be applied to a wide range of tasks. However, it leaves room for interpretation, and further guidance on implementing the requirements will need to be provided.



Companies following a responsible AI strategy early will have an **advantage over their competitors**

They will show they are good corporate citizens while actively preparing for upcoming regulations



### The five core principles of responsible AI in GlobalData's AI Governance Framework

#### Transparency

AI systems must explain their decisions, compensate IP owners, and facilitate data portability

#### Accountability

AI systems must be accountable for any bias or misinformation

#### Safety

AI systems must adopt rules to ensure data security, data privacy, and user well-being

#### Reliability

AI systems must be designed to produce reliable results consistently, regardless of circumstances

#### Social impact

AI systems must minimize their negative impact on society

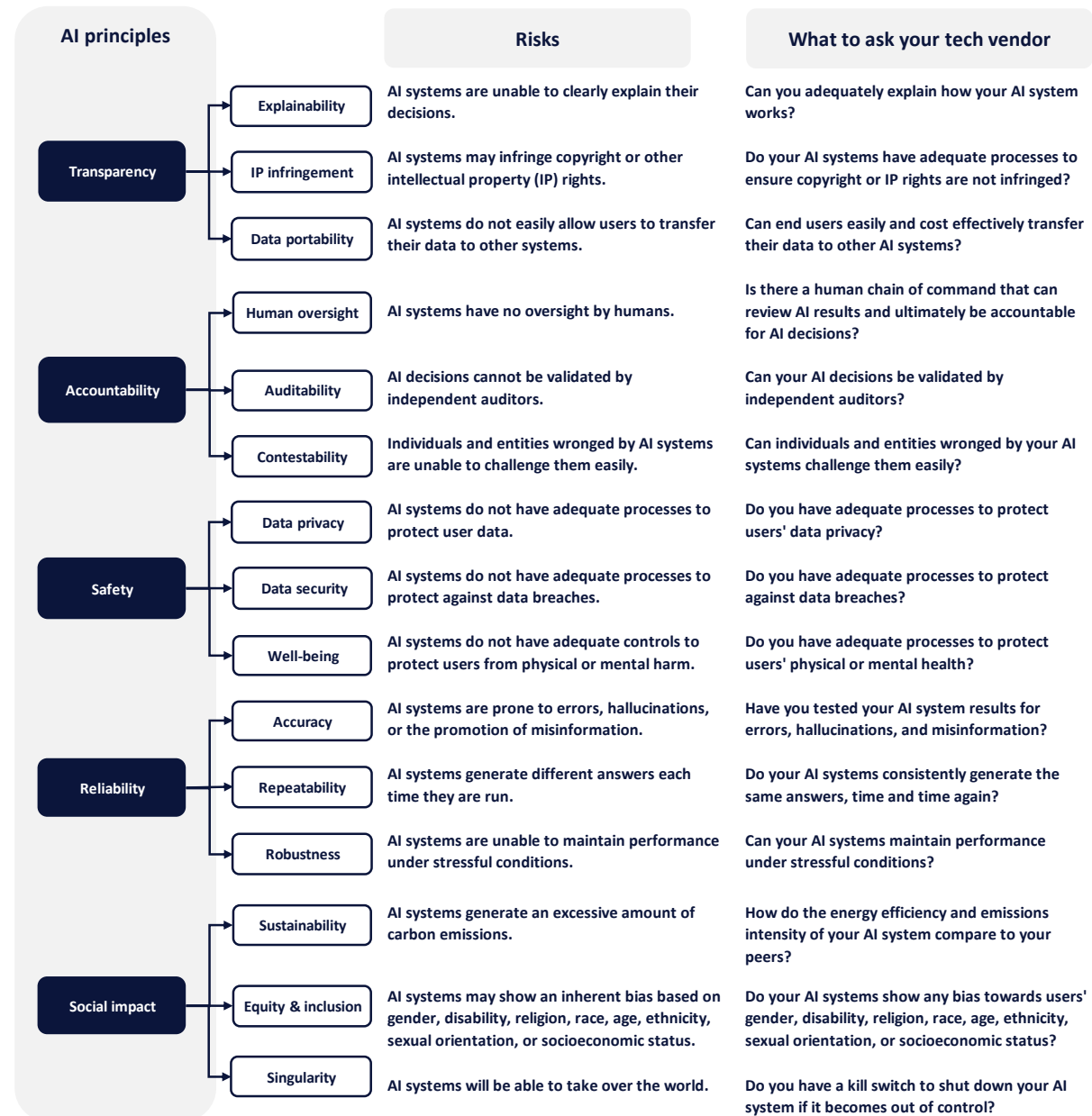
As AI regulation becomes available worldwide, organizations building, buying, or supplying AI systems must develop a responsible AI program capable of managing risk and prepare the organization to align with upcoming legislation, such as the EU AI Act. This involves mapping, verifying, and mitigating AI risks. A lack of compliance not only exposes organizations to potential violations of AI laws but can also result in reputational damage or even financial penalties if it leads to fines issued by the enforcer or resulting from the lack of trust impacting sales and partnerships.



# GlobalData's AI governance framework is a **management tool** to prepare you for future regulation

Now is the time to adopt a responsible AI strategy...

- The journey towards responsible AI is fraught with uncertainty.
- Risk can originate from different sources and multiply as AI systems are implemented.
- Corporate executives must be mindful that if something goes wrong, their company's reputation will suffer.
- Our AI governance framework provides a checklist of questions organizations should ask tech vendors to ensure that the AI systems they implement follow a responsible AI approach.



For more details, see [GlobalData's AI Governance Framework](#)

Source: GlobalData





# Recommendations



# Executive Summary

AI represents an opportunity for operational efficiencies and medical care improvement for the wider life sciences sector.

## Impact categories

- Further digitalisation & process improvements – short term, low hanging fruit
- Medical care, medical diagnosis & drug discovery – mid term
- Healthcare policy & medical research – long term

## Risks

- Data privacy
- Unclear AI regulation
- Current generative AI accuracy limitations
- Ethical issues

## Recommendations

1. Aggressively embrace AI, particularly generative AI, for process improvement
2. Define strategy to acquire generative AI capabilities (organic, partnership, off-the-shelf)
3. Engage with select healthcare IT partners to develop AI driven medical care and diagnosis
4. Engage with regulators to establish a safe data usage framework, to enable policy work
5. Explore policy work using AI to mine patient and medical data

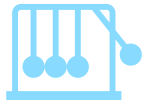
# Considerations for enterprise management



The mass appeal of generative AI lies in its **potential** to perform tasks that existing AI applications have not yet been able to master. The ability to write code, generate training data, or create natural-sounding text opens the door to a range of potential horizontal and **industry-specific applications yet to be discovered**.



Enterprises will need to decide **which model** will work best with their specific use case, whether they will need to use multiple LLMs depending on their applications, and how much **customization** will be required to make the model work for their use case(s).



Organizations looking to scale their use of AI to include generative AI should implement **multi-disciplinary** AI and Ethics teams that evaluate new AI use cases and ensure they adhere to **corporate ethical standards**.



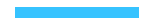
Enterprises should ensure that **human oversight** is included as a critical step in operational processes that leverage generative AI.



Organizations evaluating generative AI should look for solutions that include model **explainability** so that users understand the sources of information used to create output and can ascertain their credibility.



Multiple countries are assessing the potential threat posed by the technology to individual privacy and its potential unwanted outcomes. Organizations will need to ensure that they are adhering to **ethical and legal requirements** on a local, national, and international scale around AI.



End



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## Appendix 1: Further reading



## Further reading

### AI thematic reports

- [AI Executive Briefing - 1st Edition](#)
- [Artificial Intelligence](#)
- [AI Chips](#)
- [Machine Learning](#)
- [Tech Regulation](#)

### AI Innovation Radar reports

- [Cognitive revolution: GenAI meets retail](#)
- [Code to capital: Gen AI meets financials](#)
- [Gen I powerplay: Big Tech AI playbook](#)
- [Text-to-X: how ChatGPT and generative AI can transform the future of business](#)

### AI thematic reports by sector

- [AI in Agriculture](#)
- [AI in Automotive](#)
- [AI in Construction](#)
- [AI in Consumer](#)
- [AI in Defense](#)
- [AI in Energy](#)
- [AI in Financial Services](#)
- [AI in Healthcare](#)
- [AI in Media](#)
- [AI in Mining](#)
- [AI in Retail & Apparel](#)
- [AI in Sport](#)
- [AI in Travel & Tourism](#)

### Generative AI thematic reports by sector

- [Generative AI in Agriculture](#)
- [Generative AI in Automotive](#)
- [Generative AI in Consumer](#)
- [Generative AI in Defense](#)
- [Generative AI in Financial Services](#)
- [Generative AI in Medical Devices](#)
- [Generative AI in Pharma](#)
- [Generative AI in Retail & Apparel](#)
- [Generative AI in Travel & Tourism](#)



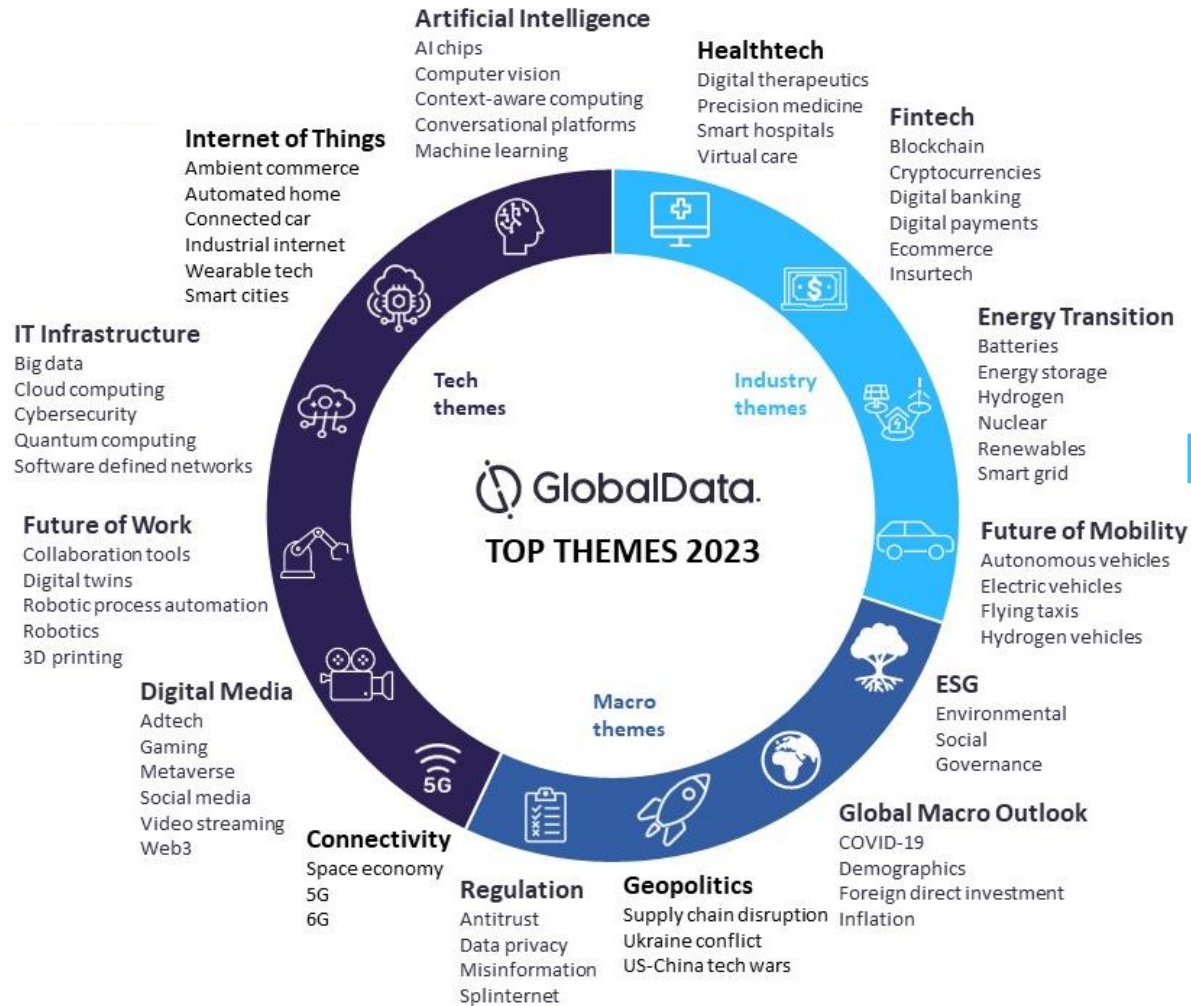
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## Appendix 2: Our Thematic Research Methodology

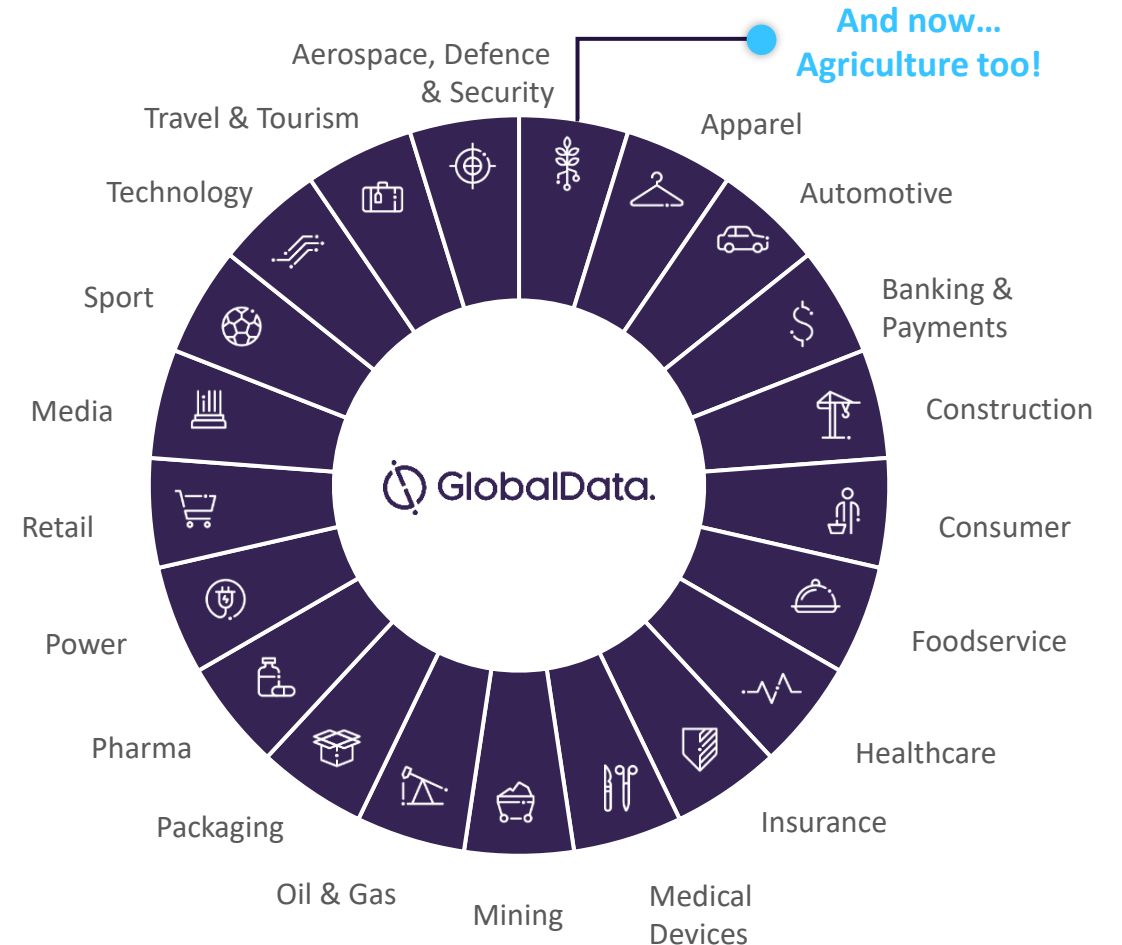
# GlobalData Thematic Intelligence covers all themes impacting 20 sectors

We define a theme as any issue that keeps business leaders awake at night

100+ themes...



...across 20+ sectors



Supported by 800+ analysts



# Our thematic research methodology

We define a theme as any issue that keeps a CEO awake at night

## Viewing the world's data by themes helps decision making

We define a theme as any issue that keeps a CEO awake at night. GlobalData's thematic research ecosystem is a single, integrated global research platform that provides an easy-to-use framework for tracking all themes across all companies in all sectors.

It has a proven track record of identifying the important themes early, enabling companies to make the right investments ahead of the competition, and secure that all-important competitive advantage.

## Traditional research is poor at picking winners and losers

The difficulty in picking tomorrow's winners and losers in any industry arises from the sheer number of technology cycles—and other themes—that are in full swing right now.

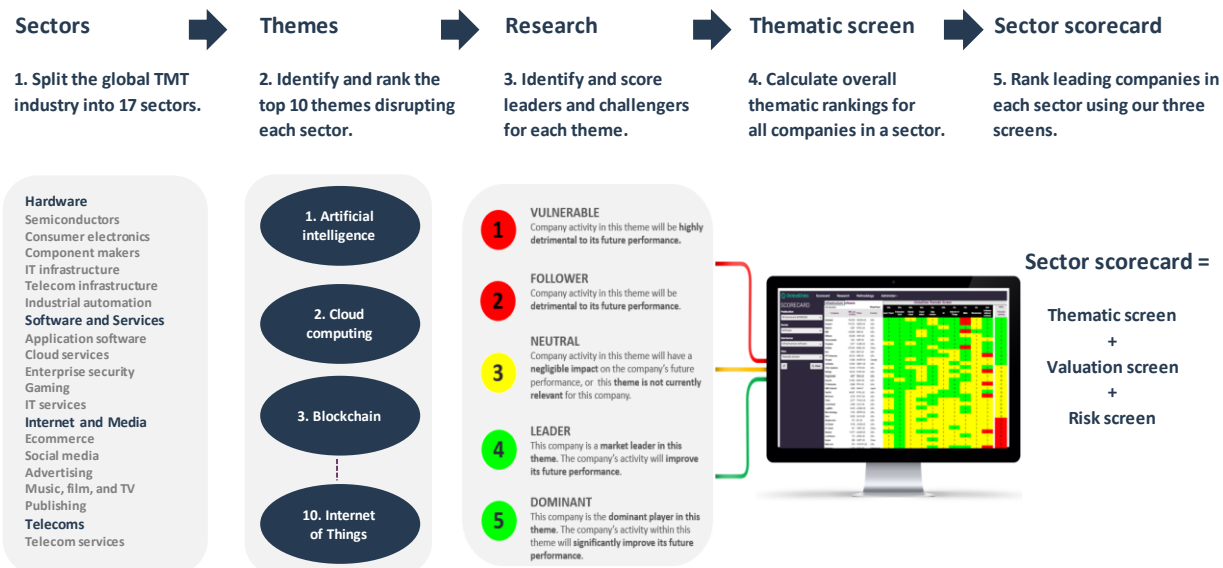
Companies are impacted by multiple themes that frequently conflict with one another. What is needed is an effective methodology that reflects, understands and reconciles these conflicts.

## That is why we developed our thematic engine

At GlobalData, we have developed a unique thematic methodology for ranking all major companies in all major sectors based on their relative strength in the big themes that are impacting their industries.

Our thematic engine tags over 145 million data items across five alternative data sets—patents, jobs, deals, filings and news—to themes. The vast datasets within our thematic engine help our analysts to produce sector scorecards which identify the companies best placed to succeed in a future filled with multiple disruptive threats.

## Our five-step approach for generating a sector scorecard, using the technology, media and telecom (TMT) sector as an example



First, we split each industry into its component sectors because a different set of themes drives each sector. Taking the TMT (technology, media, and telecom) industry as an example, we split this industry into the sectors shown in this graphic.

Second, we identify and rank the top 10 themes for each sector (these can be technology themes, macroeconomic themes, or industry-specific themes).

Third, we publish in-depth research on specific themes, identifying the winners and losers within each theme. The problem is that companies are exposed to multiple investment themes and the relative importance of specific themes can fluctuate.

So, our fourth step is to create a thematic screen for each sector to calculate overall thematic leadership rankings after taking account of all themes impacting that sector.

Finally, to give a crystal-clear picture, we combine this thematic screen with our valuation and risk screens to generate a sector scorecard used to help assess overall winners and losers.



# Our thematic research methodology (continued)

Our sector scorecards help us determine which companies are best positioned for a future filled with disruptive threats

## What is in our sector scorecards?

Our sector scorecards help us determine which companies are best positioned for a future filled with disruptive threats.

Each sector scorecard has three screens:

- **The thematic screen** tells us who are the overall leaders in the 10 themes that matter most, based on our thematic engine.
- **The valuation screen** tells us whether publicly listed players appear cheap or expensive relative to their peers, based on consensus forecasts from investment analysts.
- **The risk screen** tells us who the riskiest players in each industry are, based on our assessment of four risk categories: operational risk, financial risk, industry risk, and country risk.

## How do we score companies in our thematic screen?

Our thematic screen ranks companies within a sector based on overall leadership in the 10 themes that matter most to their industry, generating a leading indicator of future earnings growth. Thematic scores predict the future, not the past.

Our thematic scores are based on our analysts' assessment of their competitive position in relation to a theme, on a scale of 1 to 5:

- 1 Vulnerable:** The company's activity in this theme will be highly detrimental to its future performance.
- 2 Follower:** The company's activity in this theme will be detrimental to its future performance.
- 3 Neutral:** The company's activity in this theme will have a negligible impact on the company's future performance, or this theme is not currently relevant for this company.
- 4 Leader:** The company is a market leader in this theme. The company's activity in this theme will improve its future performance.
- 5 Dominant:** The company is a dominant player in this theme. The company's activity in this theme will significantly improve its future performance.

## How does our three-tiered reporting system work?

Our thematic research ecosystem is designed to assess the impact of all major themes on the leading companies in a sector.

To do this, we produce three tiers of thematic reports:

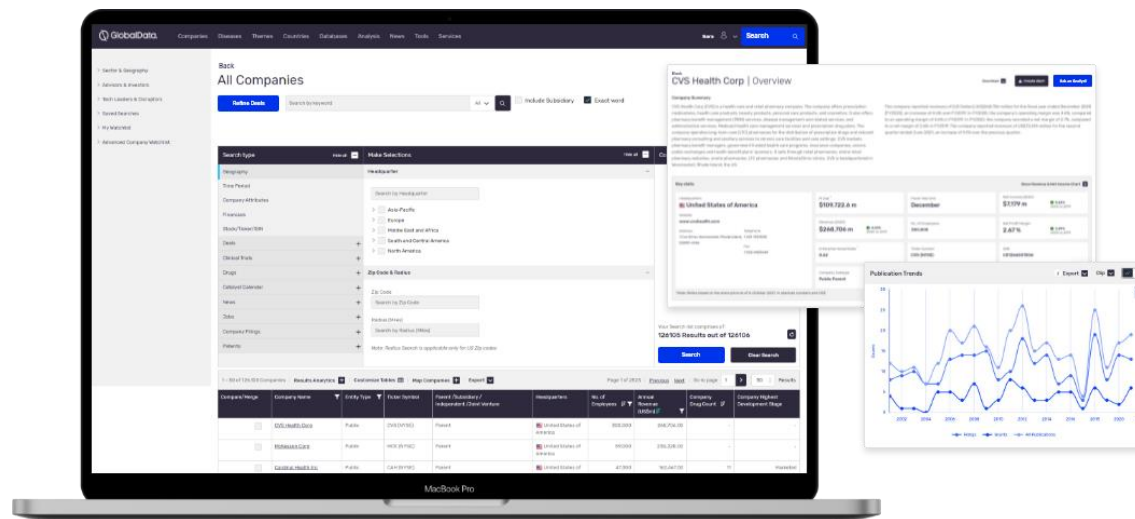
- **Single theme:** These reports offer in-depth research into a specific theme (e.g., artificial intelligence). They identify winners and losers based on thematic leadership, market position, and other factors.
- **Multi-theme:** These reports cover all themes impacting a sector and the implications for the key players in that sector.
- **Sector scorecard:** These reports identify those companies most likely to succeed in a world filled with disruptive threats. They incorporate our thematic screen to show how conflicting themes interact with one another, as well as our valuation and risk screens.



Contact us

## GlobalData is a leading provider of data, analytics, and insights on the world's largest industries.

In an increasingly fast-moving, complex, and uncertain world, it has never been harder for organizations and decision makers to predict and navigate the future. This is why GlobalData's mission is to help our clients to decode the future and profit from faster, more informed decisions. As a leading information services company, thousands of clients rely on GlobalData for trusted, timely, and actionable intelligence. Our solutions are designed to provide a daily edge to professionals within corporations, financial institutions, professional services, and government agencies.



### Unique Data

We continuously update and enrich 50+ terabytes of unique data to provide an unbiased, authoritative view of the sectors, markets, and companies offering growth opportunities across the world's largest industries.

### Expert Analysis

We leverage the collective expertise of over 2,000 in-house industry analysts, data scientists, and journalists, as well as a global community of industry professionals, to provide decision-makers with timely, actionable insight.

### Innovative Solutions

We help you work smarter and faster by giving you access to powerful analytics and customizable workflow tools tailored to your role, alongside direct access to our expert community of analysts.

### One Platform

We have a single taxonomy across all of our data assets and integrate our capabilities into a single platform – giving you easy access to a complete, dynamic, and comparable view of the world's largest industries.



# A connected platform for a dynamic world



## GlobalData Insight

Unique Data. Expert Analysis. Innovative Solutions. One Platform.

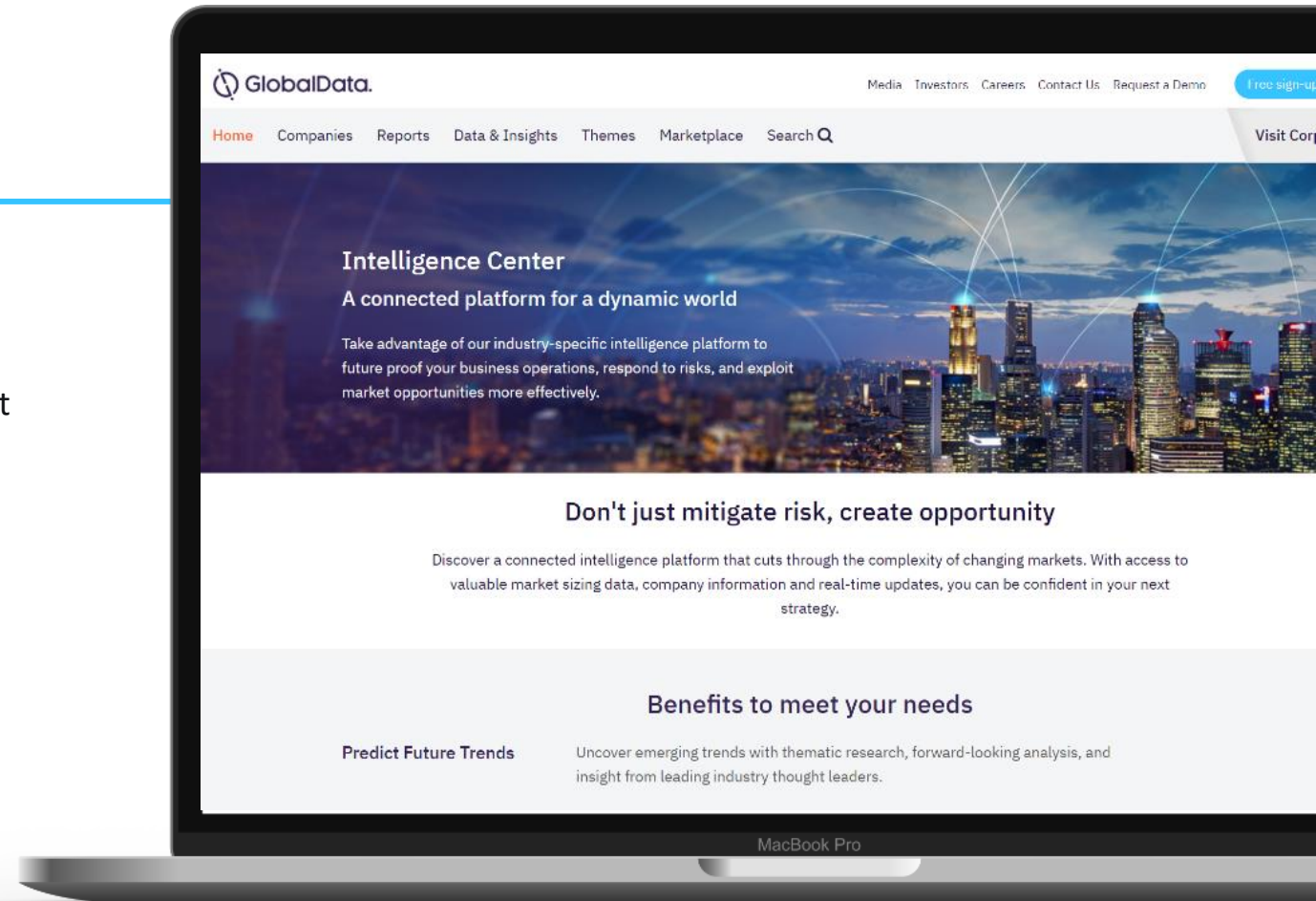
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Our comprehensive business solution will help you to exploit market opportunities more effectively.

### Use the Intelligence Center to:

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