ALGER

60 YEARS

ARTIFICIAL INTELLIGENCE:

Investment Map

Unlock Your Growth Potential.℠

An Artificial Intelligence-Driven Revolution

We believe that we are at the beginning of an Artificial Intelligence (AI)-driven revolution that will foster unprecedented change over the next couple of decades. Understanding the economic impact of AI is important as the growth and integration of AI across the world will create potential investment opportunities.

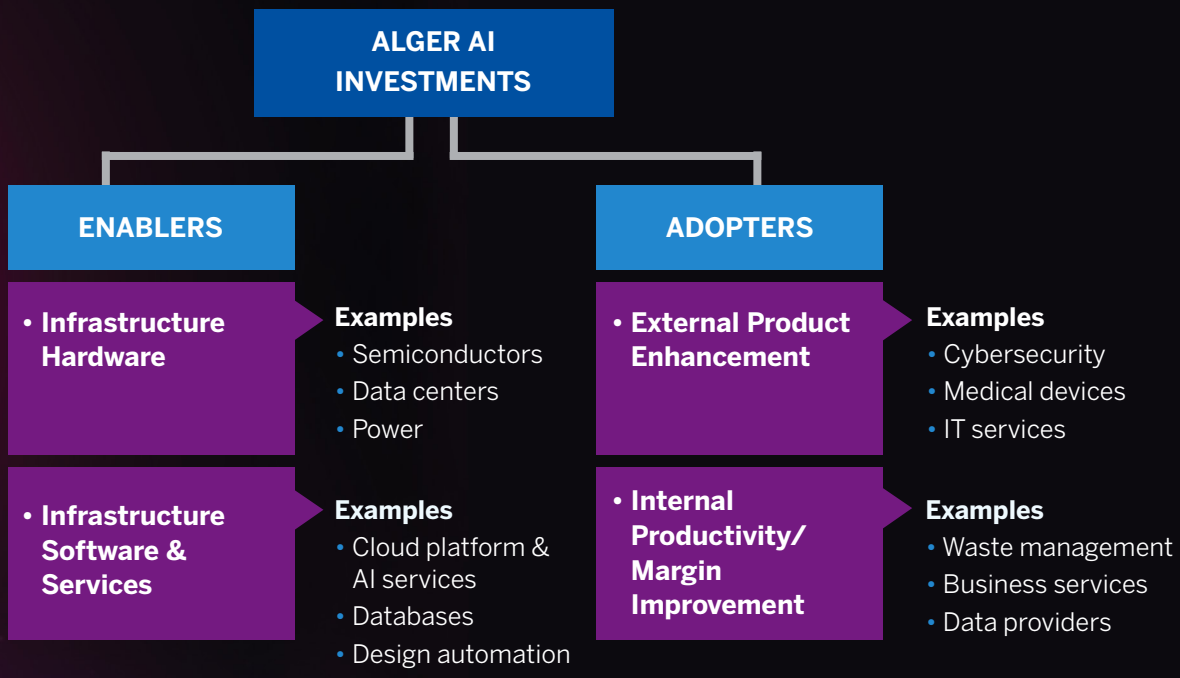
Identifying AI Investment Opportunities

Alger's approach to investing in AI includes identifying companies that are the "Enablers" and "Adopters" of this powerful technology.

- **Enablers:** Companies developing the building block components for, and investing in, AI infrastructure such as machinery, hardware, software and services.
- **Adopters:** Companies that integrate AI into their businesses to enhance their products or services or make their operations more productive.

We can point to companies today that are leading the way in both enabling and adopting AI, but we believe those classifications will shift over time as AI becomes ubiquitous.

Examples of Potential AI Investment Opportunities



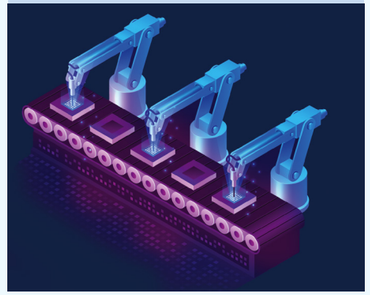
AI Investment Map

AI ENABLERS

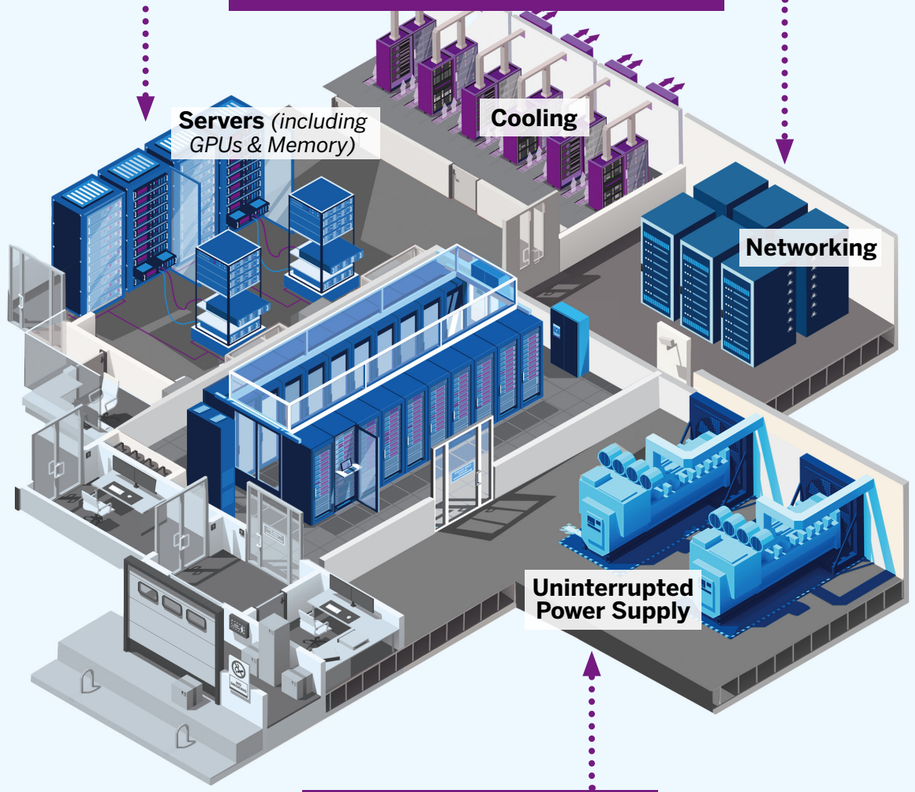
INFRASTRUCTURE HARDWARE

GPU Manufacturing

- Design & Architecture
- Wafer Fabrication
- Lithography
- Packing & Testing



Data Center



Power Generation

- Fossil Fuels
- Nuclear
- Renewables

Power Transmission & Distribution

- Construction & Engineering
- Electrical Equipment

INFRASTRUCTURE SOFTWARE

Databases

- Relational Database
- Non-relational Database

AI Foundation Model

- Large Language Models
- Specialized Models (e.g. Biotechnology)

How to Interpret the AI Investment Map

This AI investment map highlights some of the main areas within the AI investment space that Alger currently finds potentially attractive. We divide the universe between AI Enablers and AI Adopters.

Within AI Enablers, the space is split between infrastructure hardware on the left side—these are the physical components enabling AI programs and infrastructure software, which are on the right side. Infrastructure software provides access to AI-based applications. These applications include database providers that help interpret unstructured data from sources like social media, images, and audio—critical in training and querying AI foundation models like ChatGPT. AI Adopters (bottom right) are companies utilizing AI technologies to enhance their operations. These companies are categorized into two key buckets: 1) external product enhancement, and 2) internal productivity or margin improvement.

Pages 6–7 delve deeper into each component featured on the map, providing detailed descriptions and investment cases. This section provides insight into the potential opportunities and dynamics within each area.

We hope this brochure serves as a helpful guide to navigate the interconnected world of AI investments and identify areas that align with your investment goals.

AI ADOPTERS

External Product Enhancement

- Cybersecurity
- Medical Devices
- IT Services

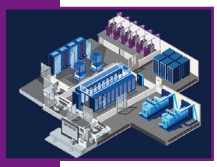
Internal Productivity/Margin Improvement

- Waste Management
- Business Services
- Data Providers

AI Investment Map Descriptions

AI ENABLERS: Companies developing the building block components for, and investing in, AI infrastructure.

INFRASTRUCTURE HARDWARE



Data Centers: A data center is a physical facility that houses and operates computer systems, networking components, and storage devices. These facilities are crucial for AI computing as they provide the necessary infrastructure to process, store, and analyze the massive amounts of data required for training and running AI models.

- ***Servers (including GPUs and High-Bandwidth Memory):*** Servers are high-performance computers within a data center that process and store data. They are essential for AI computing as they provide the computational power needed to train complex AI models and handle the large datasets required for machine learning tasks.
  - **Graphics Processing Unit (GPU)**: A specialized processor optimized for parallel computations, serving as the backbone of AI computing by accelerating the training and inference of complex AI models. GPUs are crucial for AI because they process large datasets and perform parallel computations far faster than traditional CPUs.
  - **High-bandwidth memory (HBM):** A type of high-performance computer memory whose speed and low latency make it ideal for advanced computing applications like AI. HBM is crucial for AI computing as it provides a high-speed interface between the GPU and its memory, enabling faster data access and processing—essential for training and running complex AI models.
- ***Cooling:*** Data center cooling is the process of removing heat from computer equipment within a data center to maintain optimal operating temperatures. It is crucial for AI computing as excessive heat can cause hardware failures, reduce performance, and increase energy consumption.
- ***Networking:*** Networking within a data center refers to the interconnectedness of computer systems and devices. It is essential for AI computing as it enables the efficient transfer and sharing of data between servers, storage systems, and other components, facilitating the training and deployment of AI models.
- ***Uninterrupted Power Supply (UPS):*** UPS systems provide a continuous power source to data center equipment in the event of a power outage. They are crucial for AI computing as unexpected power failures can disrupt the training and operation of AI models, leading to data loss and costly downtime.

GPU Manufacturing:

- ***Design & Architecture*** refers to the planning and development of the GPU's structure, including the number of cores, clock speed, memory, and power usage. It's crucial for AI computing as it determines the GPU's capabilities and efficiency in handling complex calculations and data processing tasks.
- ***Wafer Fabrication*** involves the production of the silicon wafers that form the foundation of the GPU. It's essential for AI computing as the quality and consistency of the wafers directly impact the reliability and performance of the GPU.
- ***Lithography*** is the process of transferring patterns using extreme ultraviolet light (EUV) onto the silicon wafers to create the intricate circuits and components of the GPU. This is crucial for AI computing as the accuracy and precision of the lithography process determine the functionality and performance of the GPU.
- ***Packaging & Testing*** are the final steps that prepare the GPU for use in electronic devices. Packaging encases the chip in protective material, providing physical protection and enabling electrical connections to other components, with advanced methods that optimize performance and heat management. Testing ensures each GPU meets strict quality, performance, and reliability standards through functionality checks and stress tests. Together, these stages make GPUs robust, reliable, and optimized for high-performance AI applications.

Power Generation: Given the intense electrical power AI programs require, uninterrupted electrical power is critical for data centers to operate effectively. Data centers consume approximately 3% of total electricity in the U.S. today. However, given the intensifying demands from AI workloads, we estimate that data centers could potentially consume roughly 10% of total electricity in the U.S. by the end of the decade, posing significant challenges for electric grid operators, in our view.[1]

Power Transmission & Distribution: As AI programs increasingly consume electricity, data centers are facing challenges securing adequate power from the grid. In fact, much of the U.S. electrical grid was constructed in the 1960s and 1970s and is now struggling to meet modern energy demands. According to the U.S. Department of Energy, approximately 70% of transmission lines are over 25 years old, with many nearing the end of their 50- to 80-year lifespans.[2]

[1] Edison Electric Institute and Alger estimates from 2023 through 2030.
[2] https://www.energy.gov/gdo/articles/what-does-it-take-modernize-us-electric-grid.

INFRASTRUCTURE SOFTWARE

Databases are crucial for AI computing as they provide a structured and efficient way to store, retrieve, and analyze the large datasets required for training and running AI models. In today's economy, we believe data is the new oil, an essential raw material fueling digital transformation. We believe that businesses increasingly need to digitize and organize their data in order to automate processes and become more efficient.

- ***Relational Database:*** Structured data is commonly organized into rows and columns and stored in a relational database (i.e., a collection of information that organizes data in predefined relationships) supporting applications such as customer relationship management or billing systems. It is particularly useful in AI training for accessing consistent, structured datasets, such as customer information and financial transactions.
- ***Non-relational Database:*** Unstructured data—encompassing formats such as text messages and emails, social media, webpages, and business documents—is stored in non-relational databases. Generative AI, for example, is particularly dependent on this kind of data for its training.

AI Foundation Models: AI foundation models are large-scale language models trained on massive amounts of text data. They are crucial for AI computing as they provide a powerful and versatile foundation for developing various AI applications, from natural language processing to content generation and machine translation (e.g., ChatGPT, Gemini, LLaMA).

AI ADOPTERS: Companies that integrate AI into their businesses to enhance their products or services or make their operations more productive. Within this framework, we further categorize these firms based on their application of AI in two key areas: 1) external product enhancement and 2) internal productivity or margin improvement.

External Product Enhancement: Companies leverage existing AI technology, such as large language models, to improve their client-facing products. This type of enhancement may improve a product's functionality and therefore client satisfaction, potentially generating increased customer loyalty and higher revenue. In our view, an example of an AI adopter in this category could be an image sharing and social media platform. By personalizing recommendations, powering visual search, and curating high-quality content through AI, a company like this can refine the user experience and achieve a strong product-market fit, aligning its platform with users' evolving needs and interests. These enhancements improve the user experience and increase the effectiveness of advertisements, boosting return on investment for advertisers and enhancing ad monetization.

- ***Cybersecurity:*** AI is being used to detect and prevent cyber threats by analyzing network traffic, identifying suspicious patterns, and responding to attacks in real-time.
- ***Medical Devices:*** AI is being integrated into medical devices to improve diagnostic accuracy, personalize treatment plans, and enhance patient outcomes.
- ***IT Services:*** AI-powered IT services are helping enterprises optimize their IT infrastructure, automate routine tasks, and improve customer support through intelligent chatbots and virtual assistants.

Internal Productivity/Margin Improvement: When used internally, AI technology can help drive margin improvement. For instance, financial institutions use AI to enhance operational efficiencies, fraud detection and credit decision making. In fact, some banks have used AI technology to achieve an 80-90% productivity improvement in the laborious "know your customer" (KYC) protocol, which requires data collection and identity verification.[3]

- ***Waste Management:*** Companies in the waste management industry are using AI to optimize operational efficiency to improve route planning for waste collection, reducing fuel consumption and labor costs.
- ***Business Services:*** AI is being deployed by business service providers to improve internal productivity and boost margins through automation of administrative tasks, customer service (via chatbots), and predictive analytics. By automating routine processes like invoicing, data entry, and contract management, companies can reduce operational overheads, minimize human error, and allocate resources more effectively.
- ***Data Providers:*** Data providers leverage AI to enhance data collection, processing, and analysis. AI enables faster, more accurate data aggregation and predictive analytics, allowing companies to offer more valuable insights to their clients while reducing labor-intensive tasks.

[3] Brown, D. (2023, October 26). JPMorgan KYC Operations Up to 90% More Productive with AI. Bank Automation News. Retrieved from https://bankautomationnews.com/allposts/ai/jpmorgan-kyc-operations-up-to-90-more-productive-with-ai/

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