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THE RISE OF GENERATIVE AI:
Four Waves That Changed Everything

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August 2025

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Manoj Tavarajoo | AI Essentials for Leaders Series – Article 5

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Generative AI is not just another technological trend. It represents a fundamental shift in how knowledge, creativity, and productivity are scaled across organisations. From producing text and code to generating images, music, and simulations, generative AI is already reshaping industries and challenging leaders to rethink their strategies.

In this article, we explore the four waves of generative AI that brought us to today's tipping point, and what this means for organisations preparing for an AI-first future.
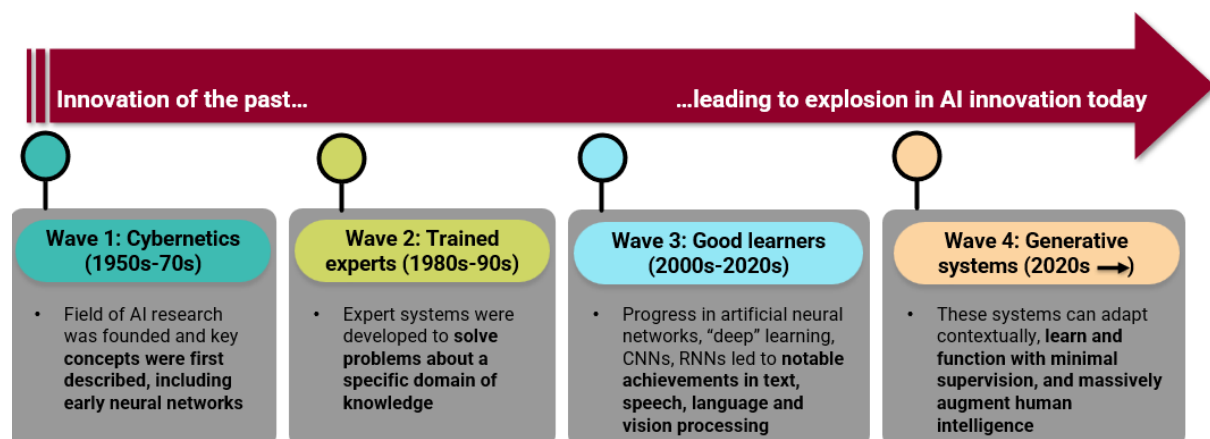

Innovation of the past... **...leading to explosion in AI innovation today**

Wave 1: Cybernetics (1950s-70s)
- Field of AI research was founded and key concepts were first described, including early neural networks

Wave 2: Trained experts (1980s-90s)
- Expert systems were developed to **solve problems about a specific domain of knowledge**

Wave 3: Good learners (2000s-2020s)
- Progress in artificial neural networks, "deep" learning, CNNs, RNNs led to **notable achievements in text, speech, language and vision processing**

Wave 4: Generative systems (2020s ➝)
- These systems can adapt contextually, **learn and function with minimal supervision, and massively augment human intelligence**

Figure 1: Progression from early AI research to today's large-scale generative models
(Source: Flagship Pioneering)

Wave 1: Symbolic AI and Expert Systems

The first wave of AI began in the 1950s and 60s with symbolic approaches, where machines followed explicit rules crafted by humans. Expert systems in the 1980s could reason about narrow domains such as medical diagnoses or engineering design.

Strengths: Provided structure and domain knowledge.

Limitations: Fragile, hard to scale, dependent on manual rule creation.

This wave introduced the idea that machines could 'think,' but adoption remained limited in practice.

Wave 2: Machine Learning and Statistical AI

The second wave, starting in the 1990s, shifted from rules to learning from data. Algorithms such as decision trees, support vector machines, and early neural networks allowed machines to make predictions based on historical patterns.

Key advances included:

- Spam filters learning from labelled emails

- Fraud detection through statistical models

- Speech recognition powered by probabilistic techniques

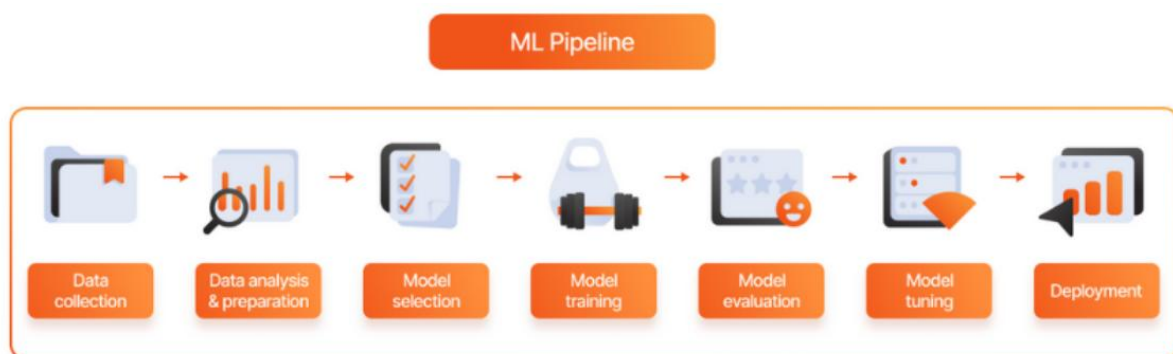This era established the foundation for today's data-driven AI.

Figure 2: Traditional Machine Learning Workflow (Source: Itelliarts)

Wave 3: Deep Learning Revolution

The third wave arrived in the 2010s, powered by advances in computing power (GPUs), massive datasets, and deeper neural networks.

Breakthroughs included:

- Image recognition surpassing human accuracy

- Voice assistants like Siri and Alexa powered by deep learning

- Real-time language translation becoming viable

Deep learning enabled machines to process unstructured data such as images, audio, and text with unprecedented accuracy. This wave drove adoption of AI across consumer applications and enterprise workflows.
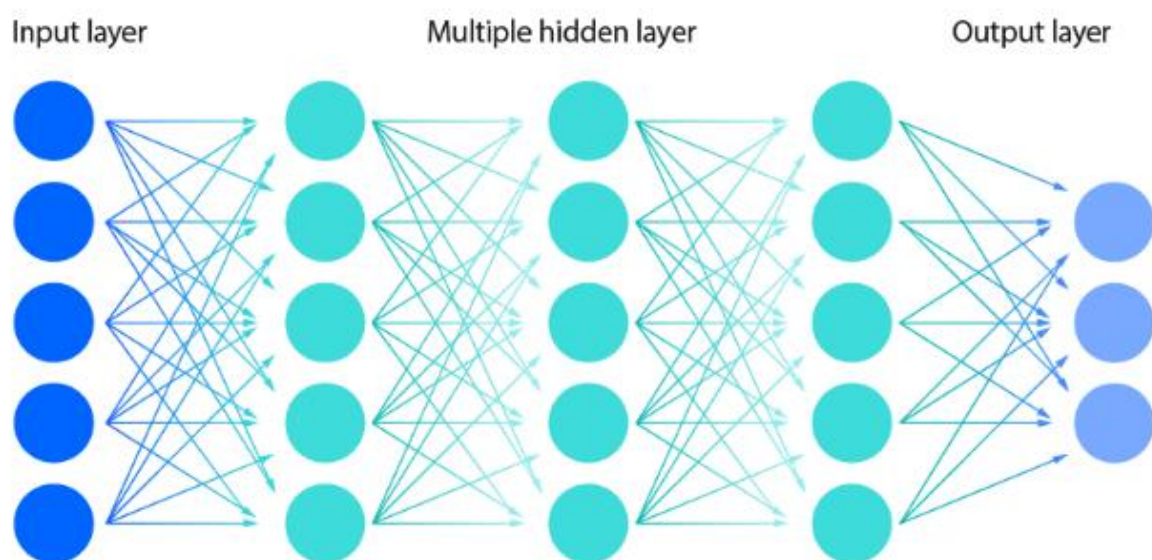

Figure 3: Deep Neural Network Layers

(illustrating how deep learning processes raw data through multiple layers)

Wave 4: Generative AI and Foundation Models

Today we are in the fourth wave: generative AI powered by large language models (LLMs) and multimodal foundation models. At its core, generative AI is a system that learns patterns from vast amounts of data and then produces new content that resembles what a human might create. Unlike previous systems that only classified or predicted, these models create outputs such as text, code, images, video, and more.
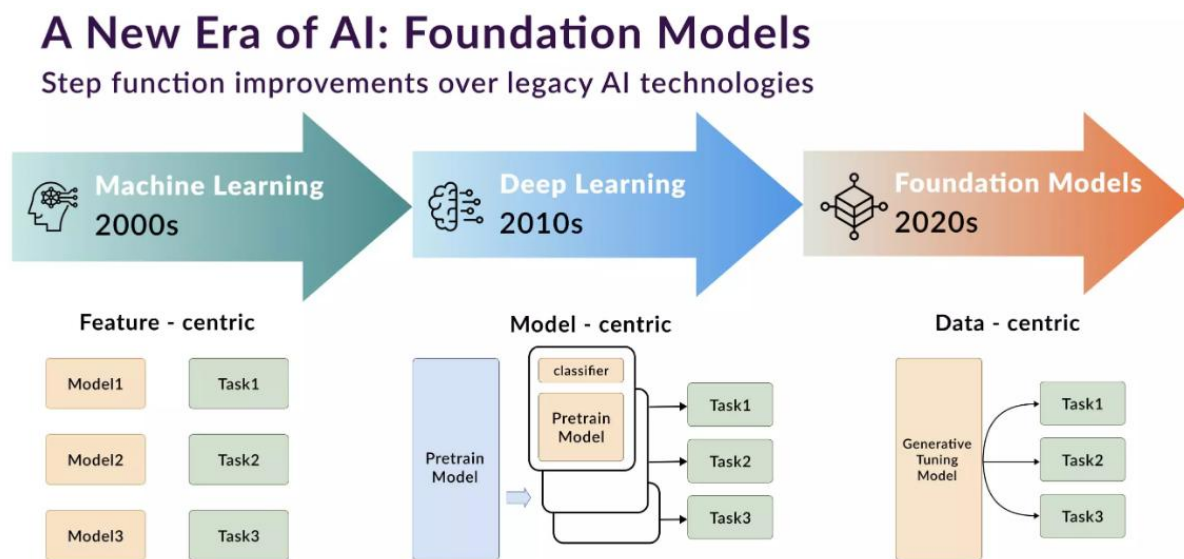

Figure 4: AI Foundation Model (Source: Dataforest)

Examples in action:

- **ChatGPT and Gemini**: Generating natural language content at scale

- **GitHub Copilot**: Assisting developers by writing and optimising code

- **MidJourney and Stable Diffusion**: Creating new images from prompts

- **Healthcare**: Drafting clinical notes and suggesting treatment options

This wave is different because the same underlying foundation model can be adapted to multiple industries and use cases. Generative AI has lowered barriers to entry, democratising access to powerful AI capabilities.
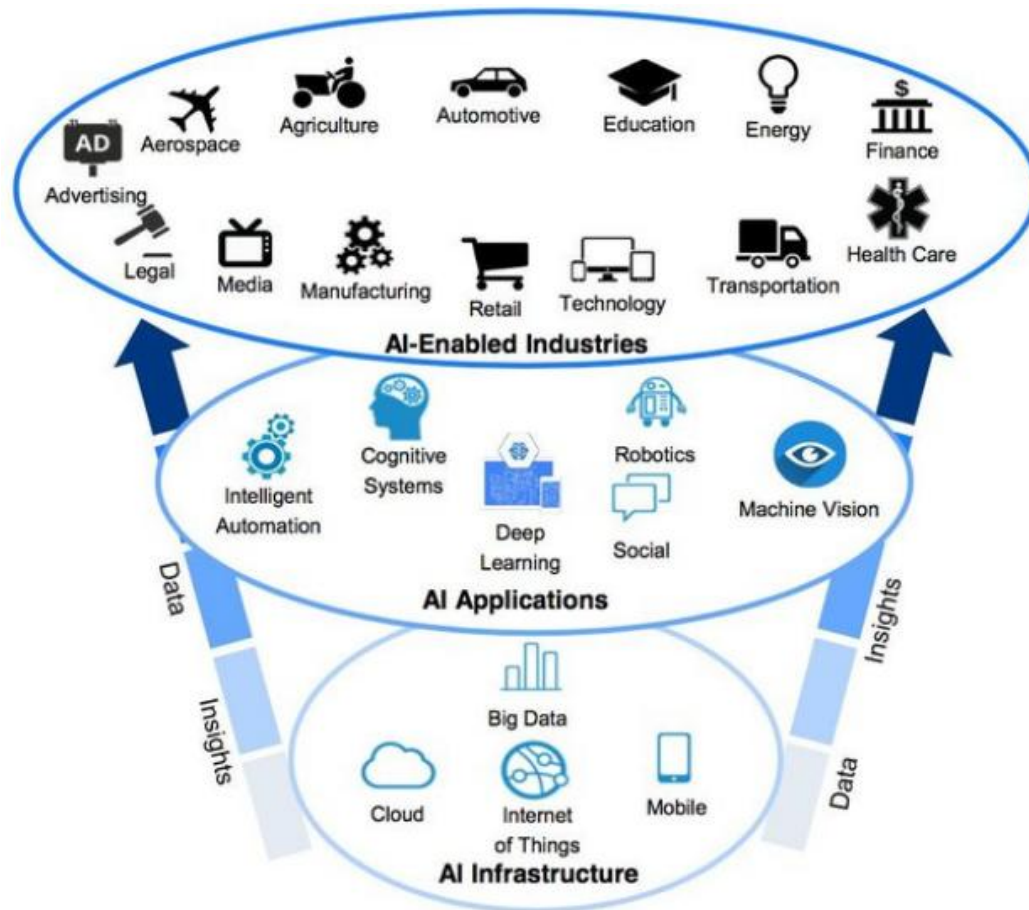
Figure 5: The AI Ecosystem (Source: Allianz Global)

The Takeaway for Leaders

The four waves of AI illustrate how the field has evolved from symbolic reasoning to data-driven learning, to deep neural networks, and now to generative creation. Each wave has expanded the boundaries of what machines can do, but this current wave is unique in its scale, adaptability, and accessibility.

For leaders, the question is no longer whether to use generative AI. The challenge is how to embed it responsibly and strategically into the organisation's operating model.

Up next:

Generative AI in the Enterprise: Redefining Work, Creativity, and Knowledge

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