

THE AI VOYAGE OF DISCOVERY

The promise of artificial intelligence (AI) is now becoming a reality. In this article, Walter Scott investment manager Tom Miedema highlights how leading companies are exploring, embracing, and harnessing the opportunities afforded by this evolving technology.

In 1950, British computer scientist and war-time codebreaker Alan Turing proposed a test for determining the existence of artificial intelligence. The general hypothesis was that if a human couldn't tell whether they were communicating with an artificially intelligent machine or another person within five minutes of engagement, this was a sign of human-like intelligence in the former.

Turing speculated that in about fifty years from the time of the publication of his paper¹, it would be entirely possible to program computers of sufficient power to make them play the 'imitation game' so well that a human interrogator would have no more than a 70% chance of making the correct identification within the five minute period. Almost on schedule, the artificial intelligence (AI) journey has progressed to the extent that a growing array of leading companies across the world are exploring and indeed embracing the opportunities that this developing technology can bring to their businesses.

As a theme, AI has been dominating the equity market psyche. The main focus to date has been on the build-out of AI infrastructure, with the likes of Nvidia and other makers of AI processors seen as the provider of the 'pickaxes' required to dig for AI gold.

OCTOBER 2024

INVESTMENT VIEWS
FROM OUR PARTNERS AT
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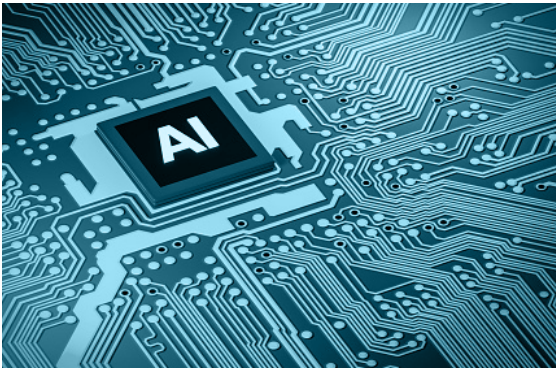
KEY POINTS

- 1** The market's main focus to date has been on the build-out of AI infrastructure.
- 2** While the market is currently preoccupied with the build-out of AI infrastructure, a growing array of companies are harnessing AI to enhance their products, services and profitability.
- 3** In our view, the next transformational AI wave will be dominated by a growing list of companies that are identifying real-world use cases for the technology.

¹Alan Turing Comments - MIND: A quarterly review of Psychology and Philosophy, No. 236, October 1950

THE 'COMPUTE' ELEMENT

We believe the compute element of the AI story has thrown a variety of other semiconductor-related businesses into the spotlight. AI has supercharged the demand for semiconductors, with generative AI (Gen AI) requiring substantially more computational power. This demand for leading-edge 'compute' - processing power – is, we believe, particularly positive for Taiwan Semiconductor (TSMC) and Dutch semiconductor lithography company ASML.



TSMC is the world's largest maker of semiconductors with a customer base which includes Apple and Nvidia. The company's competitive advantage rests on a number of factors. It operates a pure foundry model, unlike peers Samsung and Intel, which eliminates potential

competition with customers. The company has a record of strong execution, while high levels of research and development spending maintain its market leadership.

Furthermore, the company benefits from Taiwan's rich semiconductor ecosystem.

AI processor revenues currently represent 6% of TSMC's overall revenues, but these higher value chips are predicted to grow at a 50% compound annual growth rate over the coming five years and are currently forecast to account for over 20% of sales.² In the recent second quarter results, management noted the strength in AI-related demand which is currently outstripping supply. Additionally, AI-enabled devices (smartphones and PCs) are expected to materially increase the silicon content required for these devices, and should therefore boost demand across other parts of TSMC's businesses.

ASML in the Netherlands manufactures extreme ultra-violet (EUV) and High NA³ next-generation EUV tools. Each of these latter tools can cost up to US\$380 million apiece, are the size of a double-decker bus and are the critical workhorses of leading-edge chip manufacturing, an endeavor which sits at the apex of human technological ingenuity. These machines help chipmakers reduce the number of process steps in high-volume manufacturing with significant reductions in defects, costs and cycle time, i.e. the length of time required to produce a semiconductor chip.

With its monopoly EUV position, ASML remains a linchpin of the Moore's Law-esque continuation of the drive towards smaller, cheaper, more powerful and energy-efficient semiconductors. Moore's Law is more in the way of an observation that the number of transistors on an integrated circuit doubles every two years. In that regard AI is driving advanced semiconductor demand, which should be very beneficial for ASML.

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²TSMC Q1 2024 Earnings Call, April 2024

³NA = numerical aperture. NA is a dimensionless number that characterizes the range of angles over which the system can accept or emit light.

DEVELOPING THE INFRASTRUCTURE

Beyond this 'compute' stage of AI development sit the infrastructure companies specializing in providing the foundational technology and services necessary for the development, deployment and scaling of artificial intelligence applications. These businesses offer platforms and tools that enable client companies and developers to build, train and run AI models more efficiently. It is worth noting that this technology is still in its infancy, although Microsoft Corporation and Alphabet have developed leading positions in this area.



Microsoft provides the tools and services that customers use to build AI apps and services which will run on Microsoft's Azure cloud computing platform. The company is a leading investor in OpenAI, and the collaboration between OpenAI and Microsoft Azure has been a game-changer, democratizing access to

advanced AI and accelerating the development and deployment of state-of-the-art models such as ChatGPT, DALL-E and Codex.

Furthermore, AI has been built into every Microsoft cloud solution through its Copilot application. Copilot is an AI-powered tool to improve productivity and creativity across tasks such as ideas generation and preparing presentations. As a result, Microsoft's management is confident that this will be one of the fastest growing business areas in the company's history. CEO Satya Nadella commented after the third-quarter results in April that "Microsoft Copilot and Copilot stack are orchestrating a new era of AI transformation, driving better business outcomes across every role and industry".

Alphabet is establishing a leading position in the AI investment and application race, rolling out its own Search Generative Experience - which will be part of Google - that will craft responses to open-ended queries, responding to prompts with images and text, offering improved user experience and precision. It has multiple revenue opportunities including Gen AI cloud services, improved precision on Gen AI improved Search responses, and improved user experience and engagement on other services such as Maps.

Crucially, Google enjoys three significant advantages. In search channels, Google owns Android, which has over 70% of the mobile operating system market.⁴ In its product suite, Google has nine consumer-facing products with over one billion users, all of which are free. And then there is the brand. Google is a verb and is synonymous with search, and advertisers have years of experience placing hightraffic, high return-on-investment ads with Google via Search, YouTube, AdMob, Maps, Shopping and Travel.

⁴Statcounter Global Stats, June 2024

HARNESSING AI

While the market is currently preoccupied with the build-out of AI infrastructure, a growing array of companies are harnessing AI to enhance their products, services



and profitability. The AI 'gold' for these companies will be in generating incremental revenues, selling more products or services, expanding into new markets or developing new business strategies. Or they may be looking to improve the cost or capital efficiency of their operations - optimizing spending and investment to generate

higher revenue and growth while minimizing costs. There is often a common thread to market-leading companies in that they tend to have more data and stronger digital capabilities, the trust of customers, more capital to invest, and have management teams which have been proactive in thinking about how to use AI.

Adobe has been investing in AI for more than 10 years and has extensive expertise and a sizeable set of curated content (Adobe Stock), data and technology. It recently announced Adobe Firefly, an AI powered creative tool that will be integrated across its applications. Firefly uses Gen AI and simple text prompts to create higher-quality images with better composition, photorealistic details and improved mood and lighting. Adobe expects this will provide users with an easier to use, more powerful and personalized experience.

Germany's SAP is an enterprise application software vendor whose customer base includes ninety-nine of the world's top 100 companies and has over 299 million subscribers to its cloud user base. Many of the company's enterprise customers are not ready to leverage the benefits of Gen AI implementation due to outdated technology infrastructure. In many cases, their first steps to AI utilization will require an upgrade to their enterprise resource planning technology and database software and a shift to the cloud, and this should be beneficial to SAP. The 'trust' aspect is also key. For SAP's enterprise customers, many of the most useful AI applications will require access to internal data and companies should rightly be very cautious as to which vendors should be able to access this data. This should provide a large incumbency advantage to SAP.

Inevitably, AI is finding its way into healthcare applications. Intuitive Surgical is harnessing AI to unlock the enormous automation opportunity within robotic surgery to improve patient outcomes. It has been at the forefront of robotic assisted surgery for more than 25 years and, with the launch of its latest da Vinci 5 robot, looks set to maintain its leading-edge advantage. One of Intuitive's greatest advantages over its peers rests in the enormous amount of data it has accumulated over this period. Intuitive teams are using AI and machine-learning technologies to provide insights that may help surgeons using robotics learn not only from cases of lower complexity, but also from more complex cases that address anomalies and complications.

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The American scientist and futurist Roy Amara famously said, “We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.” Technological progress is rarely linear, and we expect the same to be true for AI. There will be periods when the market will get over-excited in terms of usage expectations and the pace of adoption or monetization, and for some businesses AI integration may be a slower burn than some of the more bullish proponents of the technology expect.

The initial enthusiasm over what will be a long AI journey has been driven by the demand for leading edge compute and firms supplying AI infrastructure. Companies such as TSMC, ASML, Nvidia and Microsoft will likely play a critical role in the AI ecosystem for decades to come. But how fast will the technology be adopted? How will it change our lives? And what AI enabled products and services are we willing to pay for?

The next transformational AI wave will be dominated by a growing list of companies that are identifying real-world use cases for the technology. Consequently, as long-term investors, a focus of our fundamental analysis over the coming years will be on how companies are employing AI to reach customers, more efficiently and more profitably, with better products and services.

Artificial intelligence (AI) – the ability of computers to perform tasks commonly associated with intelligent beings.

Foundry – a workshop or factory for casting metal

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MARK-610179-2024-09-23

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