Trinity Student Managed Fund
Sector Reports

Software Technology

September 2024

TRINITY SMF
STUDENT MANAGED FUND

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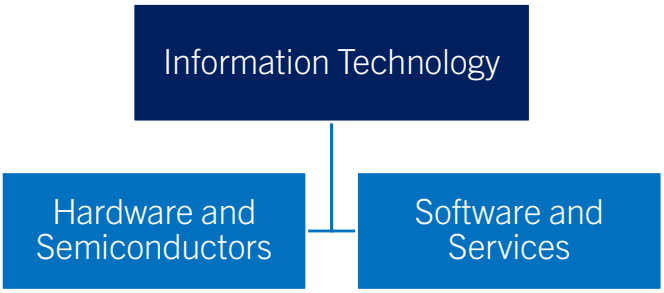
Sector Overview

The Technology Software Sector is a crucial component of the broader Information Technology (IT) industry, encompassing software development, distribution, and support services. This sector includes a wide range of businesses, from startups to large multinational corporations, across various subindustries such as application software, systems software, software as a service (SaaS), and IT consulting. It continues to evolve, driven by advancements in cloud computing, artificial intelligence (AI), machine learning (ML), and cybersecurity solutions, with software now playing an indispensable role in global business operations.



In 2023, the global software market was valued at approximately $600 billion and is expected to grow at a compound annual growth rate (CAGR) of 10-15% over the next several years. This growth is largely fueled by increasing demand for cloud-based services, AI-driven applications, and enhanced cybersecurity measures. For example, spending on cloud infrastructure is projected to grow by 21.7% in 2023, driven by its necessity in businesses' digital strategies. As AI adoption grows, there is also a rising need for AI-powered threat detection and prevention systems, particularly in the face of increasing cybersecurity risks (1).

Macro Environment and Cyclicality

The software sector is typically cyclical, with performance tied to economic trends. During downturns, businesses and consumers cut discretionary spending, affecting parts of the industry. However, areas like cloud infrastructure and cybersecurity are more resilient due to their critical role in business operations, with cloud services now essential for digital transformation strategies.

The shift to remote work and increasing reliance on AI and data analytics has further driven demand for secure, scalable software solutions. Despite short-term fluctuations, long-term sentiment remains optimistic, particularly in AI, cybersecurity, and cloud computing. Companies that integrate AI and cloud into their products are poised to stay competitive, though AI hype may temporarily outpace practical implementation. Still, software investments continue to fuel technological innovation and global growth.

Key Players

"Big 5" Tech Giants

The "Big 5" tech companies—**Apple**, **Microsoft**, **Amazon**, **Alphabet (Google)**, and **Meta (Facebook)**—dominate the technology landscape, shaping global innovation and driving market trends across a variety of industries. Each of these giants has established itself as a leader in key areas of the software sector while continuing to expand their influence into new technologies (2).

Subsectors

The technology software sector is broad and diverse, with various subsectors driving its growth and innovation. **The sector can be divided into four main subsectors, each with its own major players and unique contributions:**

1. IT Consulting & Other Services

IT consulting involves providing expertise, guidance, and strategic advice to organisations on how to best utilise technology to meet business objectives. This includes system integration, custom software development, IT strategy development, and the implementation of new technologies.

KPIs: Consumer Demand, Interest Rates, Government Spending

Key Players: Accenture, Deloitte, McKinsey & Co, BCG

2. Internet Services & Infrastructure

This subsector includes companies that provide the infrastructure and services necessary to operate websites, applications, and online services. This can include web hosting, domain registration, cloud computing, content delivery networks (CDNs), and internet security services.

KPIs: Tech Advancements, Regulatory Environment, CapEx

Key Players: AWS, Azure, Verizon, AT&T

3. Application Software

Application software refers to programs designed to perform specific tasks for end-users, such as productivity tools (e.g., Microsoft Office), customer relationship management (CRM) systems (e.g., Salesforce), enterprise resource planning (ERP) systems, and specialised industry software.

KPIs: Consumer Demand, Business Investment, Interest Rates, Technological Advancements, GDP

Key Players: Microsoft, Oracle, SAPI

4. Systems Software

Systems software provides the platform that allows application software to run. This includes operating systems like Windows and Linux, database management systems, and network management software. This subsector is critical for the functioning of hardware and other software applications.

KPIs: Consumer Demand, Tech Advancements, Regulations

Key Players: Microsoft, IBM, Oracle

Current Climate

The current landscape of the technology software sector is largely driven by developments in systems software, which accounts for over 57% of the sub-industry, followed by application software at 28.1%, and a growing role of IT consulting services (10.2%). This concentration reflects the increasing demand for foundational software solutions that drive innovation in AI and cloud computing (3).

Geographically, the tech sector remains heavily concentrated in the United States, which represents 88.86% of the market, with smaller but notable contributions from countries like Germany (3.74%) and Canada (3.07%). The global nature of the industry highlights the diverse hubs of innovation driving software growth across borders, although the U.S. clearly dominates the landscape (3).

Figure 1: ***Sub-Industry Weights (28)***

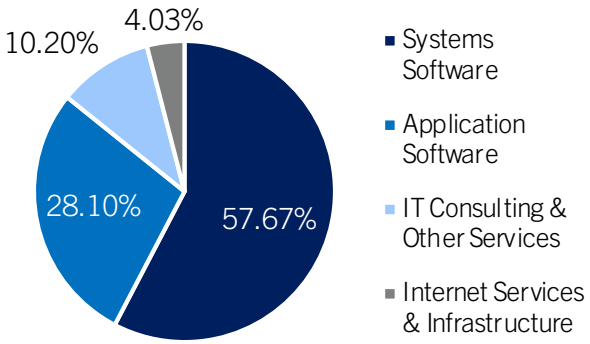
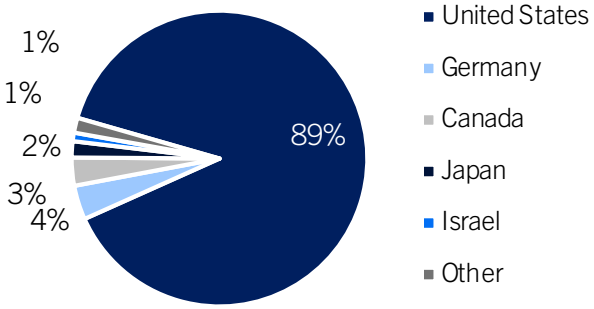


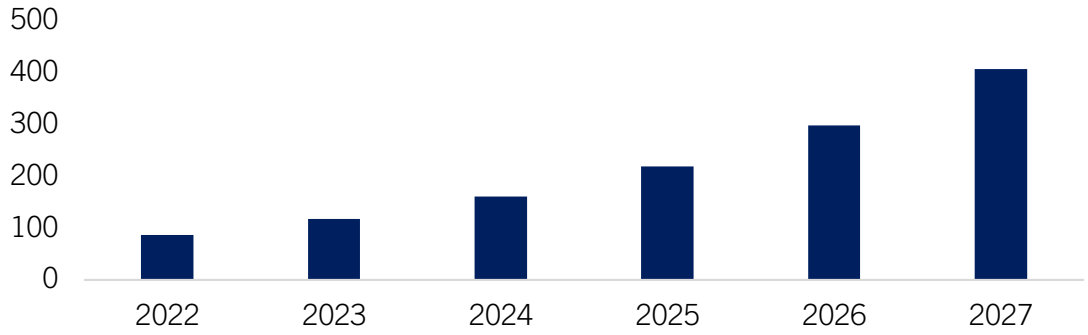
Figure 2: ***Country Weights***



Understanding the technology software sector is crucial to grasping broader global innovation. In the US, more than one-third of economic growth over the last decade has stemmed from tech, according to the Information Technology and Innovation Foundation. While hardware, semiconductors, and software differ, the AI surge has driven demand for GPU chips, signalling increasing integration among these subsectors. Currently, the tech software climate is heavily driven by AI advancements and their applications.

The global AI software market is projected to skyrocket from $86.9 billion in 2022 to $407 billion by 2027, a CAGR of 36.2%. Cloud services have grown alongside AI, with enterprise spending on public cloud services expected to hit $591.8 billion in 2023, up from $490.3 billion in 2022. Major players like Microsoft, Amazon, and Google continue to reap the benefits as businesses embrace cloud-first, AI-enabled strategies.

Figure 3: ***Artificial Intelligence Market Worth 2027***



AI applications are transforming industries, from healthcare to finance, while cybersecurity has become a priority. The global cybersecurity market is expected to grow from $165.78 billion in 2021 to $366.10 billion by 2028, with a 12% CAGR (29). SaaS models also dominate, growing at a 27.5% CAGR, driven by demand for scalable, subscription-based solutions (4).

Despite macroeconomic pressures like rising interest rates and inflation, software companies focused on enterprise solutions and AI infrastructure show resilience. The US Bureau of Labor Statistics projects 377,500 IT job openings annually from 2022 to 2032, with a 14% job growth rate, far outpacing the 3% average across industries (4). This highlights the sector's resilience and strong demand for talent in AI, cloud computing, and cybersecurity, ensuring that the tech sector remains a pillar of economic growth globally.

Investment Themes

Cloud Computing

Software as a service companies deliver software applications over the internet on a subscription basis. This model offers recurring revenue, scalability, and lower upfront costs for customers. Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) provide cloud infrastructure and platforms, enabling businesses to build, deploy and manage applications without needing their own data centres.

Artificial Intelligence (AI) and Machine Learning (ML)

AI-Driven Software: AI and ML are transforming software by enabling predictive analytics, automation, and natural language processing. AI-driven software has sparked the implementation of customer service chatbots, fraud detection, and recommendation engines each of which is predicted to produce shareholder value equivalent to that of the internet over the coming years. Much of this has already been priced into the market however over the long term we expect to see increased revenue, reduced costs and an

overall boost in the return on investment across nearly all industries driven by this technology.

Cybersecurity

With increasing cyber threats and stricter data protection regulations (e.g., GDPR, CCPA), the demand for comprehensive cybersecurity solutions is growing. This includes software for threat detection, encryption, identity management and network security. The overall shift towards "Zero Trust" security, where no user or device is trusted by default, is driving investment in software that continuously verifies users and devices.

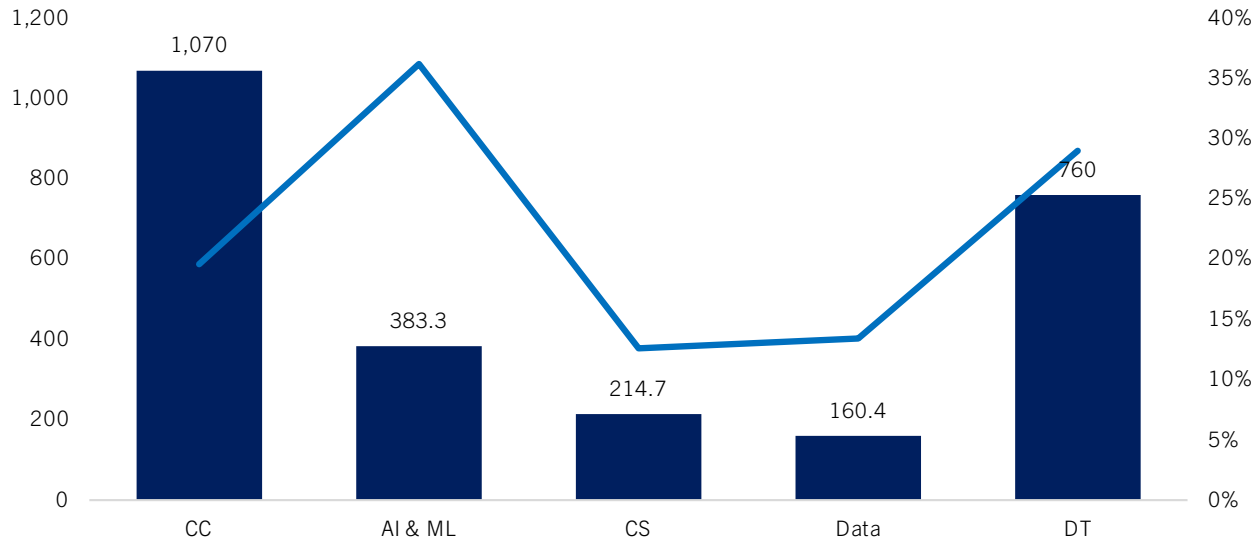
Data

We see the exponential growth in data collection and storage only continuing to multiply as new machine learning and analytics models play increasingly large roles in consumer and business decision making. Companies that can provide data insights will especially capitalise on data trends.

Digital Transformation

Accelerated by the pandemic, there is a push for firms to implement digital workflows. Additionally, firms increasingly want in-house integration of services rather than relying on hiring out. They must strike a balance between globalisation and self-reliance.

Figure 4: Investment by Theme in Billions and CAGR (2024 Projections)



Current Holdings

Microsoft (NASDAQ: MSFT) – BUY

Microsoft remains one of our core holdings due to its strong position in the technology sector, underpinned by its diversified revenue streams, leadership in cloud computing, and robust financial performance. The company's ability to innovate and adapt to evolving market trends, coupled with focus on high-growth areas such as artificial intelligence, cloud services, and enterprise software, makes it a secure investment.

Investment Thesis

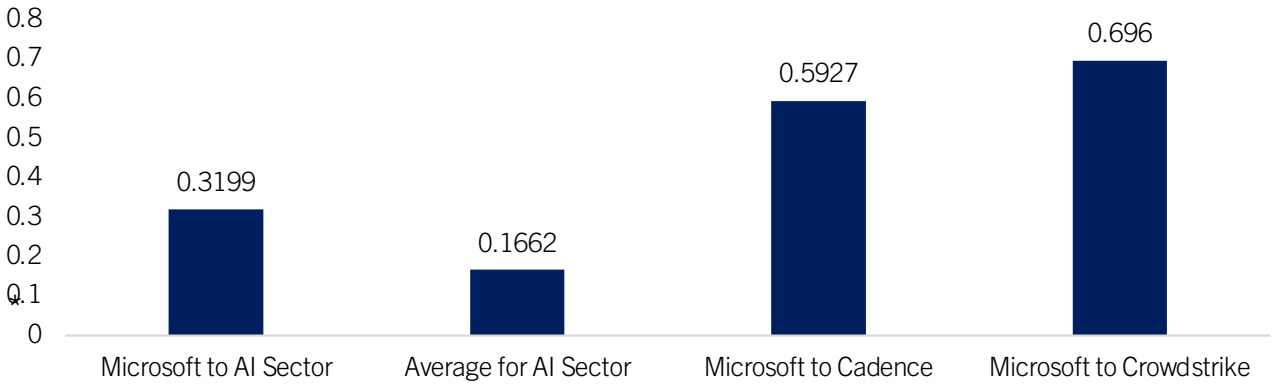
Microsoft remains a core long-term holding for our portfolio due to a mixture of their strong diversification and management along with positions in the cloud computing and AI markets.

Microsoft Azure continues to be a significant growth driver, with double-digit revenue growth. Azure positions Microsoft as a leader in the cloud market, second only to Amazon Web Services (AWS). While currently, Microsoft is underperforming following the FY2024 Q4 Azure miss, this is representative of the overall constraints of AI and the AI bubble. Trajectory for FY 2025 remains positive with increased expenditures on new and improved AI solutions (9).

Risk

Microsoft's performance is tied to the success of cloud computing solutions, along with the success of AI and semi-conductors. While they are currently aligned with their success, dynamic changes in the software sector can put that success at risk. Acknowledging this risk, we calculated the correlation coefficient Microsoft had with the top twenty AI stocks on the Nasdaq 100 and found it held the third highest correlation in the market of 0.36 (10). Thus, Microsoft is reasonably correlated with AI stock success, and any perceived AI risks apply to our holding of Microsoft as well.

Figure 5: ***AI Correlation Coefficients***



Cadence Design Systems (NASDAQ: CDNS) – HOLD

Cadence Design Systems, Inc. is a global leader in electronic design automation (EDA) software, hardware, and intellectual property used in the design of semiconductor chips and electronic systems. As demand for more advanced chips grows in sectors like AI, 5G, automotive and IoT, Cadence benefits. The company has shown consistent revenue growth, driven by increasing complexity in chip design. Their business model, which includes a mix of recurring software licenses and long-term contracts, provides financial stability and predictability.

Investment Thesis

Cadence's market leadership provides them with a strong competitive moat, making it difficult for new entrants to disrupt their position, and they are well positioned to benefit from emerging trends in AI, machine learning, cloud computing, and autonomous vehicles.

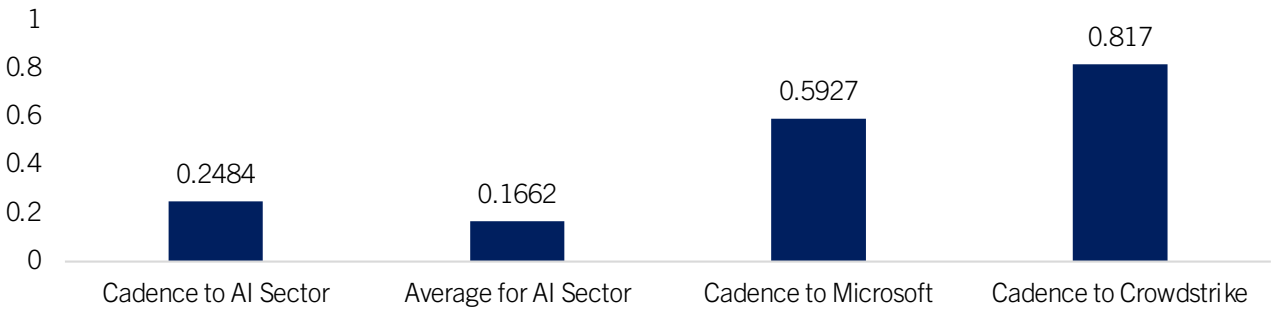
Current trends within Cadence indicate that the company is preparing to make a number of acquisitions in order to diversify its income streams away from exclusively the semi-conductor industry. Their Q2 2024 financial reports showed a sharp rise in long-term debt, including the issuance of $2.5 billion in unsecured bonds, which were rated 'A-' by the credit rating agency Fitch.

Risks

Fitch also noted that the current operating margin necessary to indicate continued strength within the company was 40%, currently it is 40.7%. With the new debt, hinged on this figure, added this margin is important to watch.

Cadence, as with Microsoft exhibits significant correlation to our other holdings and with the wider tech sector, resulting in increased risk taken on as pricing is intertwined. Cadence displayed an above average correlation to the top 20 AI stock on the Nasdaq 100 with 0.25 meaning risks within the semi-conductor industry as well as the wider technology industry should apply to our holdings in Cadence as well (13).

Figure 6: ***AI Correlation Coefficients***



CrowdStrike (NASDAQ: CRWD) – HOLD

CrowdStrike Holdings, Inc., an American cybersecurity company is a recent addition to our portfolio. Although their July 19th update caused a global outage and led to a temporary drop in stock prices, their Q4 earnings report in August shows that the company's financial performance and outlook remain positive.

Investment Thesis

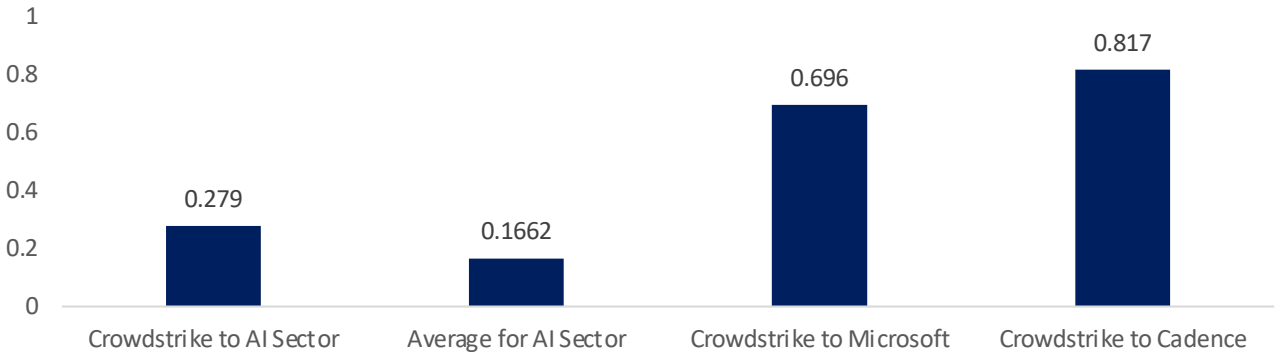
CrowdStrike's market leadership in endpoint defence, protecting consumer and business devices from attacks and data leaks provides them with a rare value in the conduct of modern business as technology only continues to become more integrated into our daily lives (14).

The firm's financial and reputational outlook remains strong despite the recent outage, as proactive customer retention efforts have stabilised the client base with only a minimal impact on cash flow. Since the issue stemmed from a software update rather than a security breach, CrowdStrike has been able to enhance and maintain its platform without significant damage to its market position. We see this dip in the stock as an overreaction by the market, presenting an opportunity to invest in a company with solid technology and financial performance at an undervalued price.

Risks

Questions remain over the result of current litigation taken against CrowdStrike and its IT partner Microsoft. The result of the key case brought by Delta Airlines will be indicative of any future lawsuits. Similarly, there remains risk intrinsic to the cybersecurity industry that large incumbents will be slow to evolve to new risks. CrowdStrike similarly exhibits significant correlation to both the wider software sector and to our other current tech holdings. Correlation to the sector was over 10% higher than the average scoring at 0.278 while its similarities in movement to both Microsoft and Cadence were very high, with coefficients of 0.696 and 0.817 respectively (15). This high level of overlap between our holdings indicates a lack of hedging in our portfolio, something to be considered in future purchasing decisions.

Figure 7: ***AI Correlation Coefficients***



Risks

High Interest Rates

High interest rates increase borrowing costs, making it more expensive for tech companies to fund growth initiatives like R&D and acquisitions, which can slow innovation. As tech firms are often valued on future earnings, higher rates reduce the present value of those earnings, leading to lower stock valuations and investor confidence. Additionally, high rates can decrease consumer spending on non-essential software. However, recent interest rate cuts by the Federal Reserve and ECB (50 and 25 basis points, respectively) improve prospects for the sector. While tech software companies are not strictly cyclical or non-cyclical, lower interest rates can still offer some benefit by reducing capital costs.

Economic Downturns

In an economic downturn, businesses often cut IT budgets, leading to slower sales for enterprise software as companies delay upgrades and implementations. Consumers also reduce spending on non-essential software, affecting sectors like gaming or subscription services. Companies may opt for cheaper alternatives or push for lower prices, increasing competition and squeezing profit margins, which can hurt software providers unable to compete on cost.

Privacy Concerns and Regulations

As governments impose stricter privacy laws, companies must invest in compliance or risk fines, complicating product development and limiting data use, which can hinder innovation. Additionally, numerous lawsuits and investigations target major software firms, focusing on anti-competitive behaviour. These cases impact our holdings directly and indirectly, as rulings against other tech giants will set precedents. Microsoft is facing four major investigations, including from the FTC over its acquisition of AI startup Anthropic and from the European Commission regarding its bundling of Teams with Office 365. The outcome of Alphabet's ad-revenue case will likely influence Microsoft's litigation (16)(17)(18)(19).

Cross-Equity Correlation

Recent trends like the rise of passive funds, the yen carry trade, and the boom in AI investment have driven liquidity into a small number of firms across a few key industries, particularly semiconductors. This has tightly linked the performance of previously independent companies, leading to higher cross-equity correlation. As a result, investors in these stocks face heightened correlated risk, where negative events in one firm or sector can significantly impact others. It's crucial to recognise this risk, as it affects both our current and potential holdings, and should be factored into our decision-making.

Geopolitical and Election Considerations

Short-term performance of Technology Software stocks will depend closely on both geopolitics and the upcoming US Election.

US Election Considerations

Category	Trump Win	Harris Win
Trade & Globalisation	• Potential tariffs on tech imports (China focused) • Focus on domestic manufacturing	• Support for global trade agreements • Multilateral tech cooperation (EU especially)
Tax and Regulatory Policy	• Corporate tax cuts • Deregulation in tech and data privacy	• Higher Corporate taxes • Stricter data privacy laws and antitrust
Innovation and R&D	• Favorable environment for AI and defense tech	• Increased funding for green tech • Stricter oversight on AI and general innovation

Legislative progress, however, hinges on the makeup of Congress. In the case of a divided Congress, as is expected, both candidates will struggle to pass any significant tech laws. Even from 2021 to 2023 when the democratic party had control of both the House and Senate, none of the proposed tech legislation passed. This renders the judiciary branch the balance check on any executive tech intervention, as well as placing power in the hands of states to pass their own legislation.

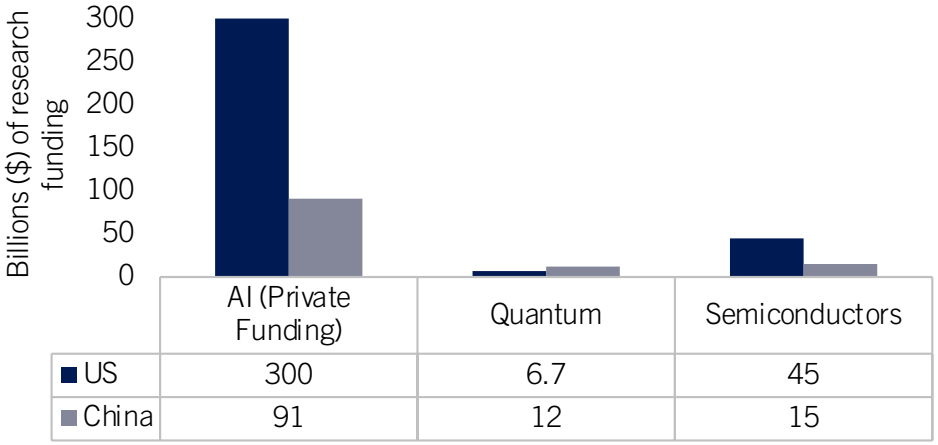
Geopolitical Considerations

Geopolitical risk as it relates to the technology software sector revolves primarily around the relationship between the **US and China**. As tech innovation becomes a means of showcasing international hegemony, the US and China are engaged in a race towards monopoly and self-sufficiency.

Governments are increasingly using industrial policy to promote self-sufficiency in strategic technologies, driving geopolitical competition. While the US Government has pushed to expand domestic production and development of important tech, China has also been striving to become self-sufficient to reduce reliance on foreign suppliers, particularly the United States. The United States has imposed restrictions on advanced computer chips amid news that China will match or surpass the United States in the next decade (20)(21).

As a result, governments are increasingly using industrial policy to promote self-sufficiency in strategic technologies, driving geopolitical competition. While the US Government has pushed to expand domestic production and development of important tech, China has also been striving to become self-sufficient to reduce reliance on foreign suppliers, particularly the United States. The United States has imposed restrictions on advanced computer chips amid news that China will match or surpass the United States in the next decade (22)(23).

Figure 8: ***US vs. China Progress in Key Tech***



	AI (Private Funding)	Quantum	Semiconductors
US	300	6.7	45
China	91	12	15

Importantly, where China lags the US predominately is in generative AI. The US has semiconductor chip prowess through NVIDIA, along with heavily funded Large Language Model (LLM) innovations from OpenAI, Google and Anthropic. Governments, including the US and China, view AI development as critical to national security (24). As shown in figure 7, the US far surpasses China in private investment with $300 billion compared to China's $91 billion (31). Public funding is more difficult to determine, as estimates vary. While US chip restrictions will delay Chinese progress, China's Huawei along with triple the incoming AI talent suggest they're not far behind. From a policy implication perspective, this race to lead the global IT sector may emerge as the primary source of economic and political instability unless rival nations reach a compromise. Investors should follow national AI strategies and be mindful of how protectionist policies may influence the growth of AI startups and software firms.

Global Cybersecurity Threats

Concerns of tech advancement surpass power concerns, and even have implications to national security. Rising geopolitical instability is linked to an increase in cyberattacks targeting critical infrastructure and tech companies, particularly from nation-state actors in regions like Russia and North Korea. Growing cybersecurity threats elevate the demand for robust security software, which could benefit firms offering cybersecurity solutions.

Outlook for the Year

Staying ahead of the market over the next year will require capitalising on emerging trends within the technology sector that are poised for significant growth but have not yet been fully factored into market valuations. Our focus will be on three key areas: Cybersecurity, Quantum Computing, and Integrated Business Software.

Cybersecurity

Outlook

The demand for cybersecurity solutions is expected to surge as businesses increasingly prioritise the protection of their digital assets. With the rise in cyber threats and the growing sophistication of attacks, companies are investing more heavily in cybersecurity measures. This trend is driven by both regulatory requirements and the need to protect against financial and reputational damage. We anticipate that companies offering advanced cybersecurity solutions, particularly those focused on AI-driven threat detection, zero-trust architecture, and cloud security, will see significant growth. As organisations continue to move their operations to the cloud, securing these environments becomes paramount, creating opportunities for providers that can offer comprehensive and scalable solutions (25).

Market Positioning

It will be crucial to identify and invest in companies that are leaders in this space, particularly those that can demonstrate innovative approaches to emerging threats. Companies that focus on automation, reducing human error, and integrating cybersecurity into broader IT systems are likely to outperform.

Quantum Computing

Outlook

Quantum computing remains in its early stages, but its potential to revolutionize industries cannot be overstated. Over the next year, we expect to see increased investment in the sector as businesses begin to explore how quantum computing can solve complex problems that are currently beyond the capabilities of classical computers. Early adoption and investment in quantum technologies will be crucial. Companies that are at the forefront of quantum research, as well as those developing software and algorithms tailored for quantum computing, are positioned to benefit as the technology matures. The focus will be on applications in cryptography, materials science, and complex system modelling.

Market Positioning

Investing in companies that have established partnerships with leading research institutions or have demonstrated early success in quantum developments will be key with classical computer integration being another area of interest for our sector.

Integrated Business Software

Outlook

The trend towards integrated business software is expected to gain momentum as companies seek to reduce reliance on outsourcing and bring more processes in-house. This shift is driven by the need for greater control over business operations, improved efficiency, and the desire to leverage data more effectively across the organisation. Integrated software solutions that offer seamless integration across various business functions—such as finance, HR, supply chain, and customer relationship management—will be in high demand. The focus will be on solutions that can automate routine tasks, provide real-time insights, and enhance decision-making capabilities.

Market Positioning

Companies that offer modular, scalable software solutions that can be customised to meet specific business needs will have a competitive edge. The ability to deliver end-to-end solutions that reduce the complexity of managing multiple systems will be a key differentiator. Additionally, firms that can demonstrate strong customer support and continuous innovation will be well-positioned to capture market share.

September Watchlist

EXPN (+22.97%)	Experian PLC is a data and credit analytics company that helps businesses and customers to make informed financial and commercial decisions.
PLTR (+119.84%)	Palantir Technologies builds software infrastructure for large organisations to integrate, store and analyse their data to facilitate decision making and large-scale operations.
PSTG (+43.02%)	Pure Storage produces storage devices called all-flash storage arrays that replace spinning disk storage with flash memory drives improving efficiency.
TEAM (-31.26%)	Atlassian produces software that helps to streamline the software development process for companies and startups with collaboration and issue tracking software.

Case Study

Quantum Computing

Quantum computing continues to trend upwards with progress being made on a continuous basis whereas in the past it often relied on momentary breakthroughs. Our sector feels strongly that this industry will have significant investment opportunities ahead which we must be positioned to benefit from. We advise that close observation is required and that possible investment cases may show up within the next two years.

As a technology, Quantum computing has been around since the 1980s but remained largely theoretical until as recently as 2016. Since then, there has been steady progress in developing the number of qubits, a type of recreated atom which allows for complex decision making, within these computers. In 2016 there were 5 Qubit computers, while the current most advanced model utilises 1125 (26). To become commercially viable, it is estimated new models will need between 10-20,000 qubits as well as a fidelity, measurement of accuracy, of nearly 100%. With current machines at a tenth of this qubit demand and 99.%% fidelity only achieved on a 30-qubit computer, there is still a long way to go, however, progress is moving at a faster and more sustained pace.

This progress has been and will continue to be largely driven by public sector spending as national security use cases, particularly surrounding international cryptography demand government involvement in the development of the technology. Within the private sector, however, Quantum Computing will provide significant economic value ranging from drug discovery ($40-80 billion), search optimisation ($50-100 billion), financial market simulation ($20-35 billion) and logistics optimisation ($50-100 billion). This is where possible investment cases will come from and will be a part of our strategy moving forward (27).

Figure 9: ***Global Quantum Computing Market ($ Millions) (28)***

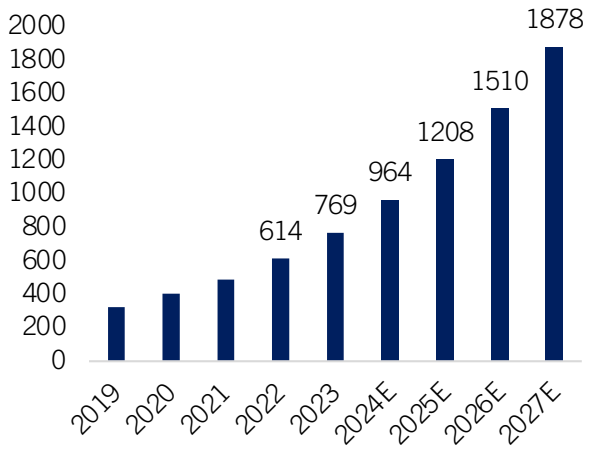
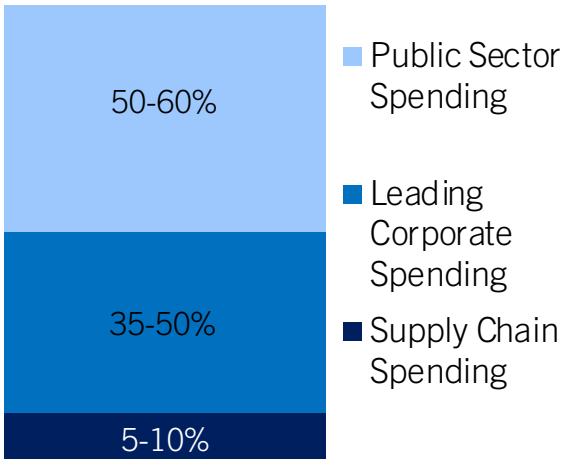


Figure 10: ***Forecasted Investment Channels (29)***



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