GP. Bullhound

JANUARY 2025

Technology Predictions 2025

Contents

The view

FROM GP BULLHOUND

Now in its 18th year, GP Bullhound's Technology Predictions report continues to set the standard for industry foresight, with nearly 90% of our predictions proven accurate since inception. Drawing on our deep expertise in software and unparalleled global market insights, we are proud to present our predictions for 2025, highlighting the transformative trends shaping the future of technology.

Per Roman
MANAGING PARTNER, GP BULLHOUND

Alec Dafferner
PARTNER, GP BULLHOUND

STATE OF THE MARKET

As we approach 2025, the technological landscape is evolving at an unprecedented pace, driven by advancements in artificial intelligence and quantum technology that are challenging assumptions across digital identities, cybersecurity, space, and more. Amid economic uncertainty, AI remains central to this transformation, with its potential amplified by developments across sectors that extend its applications far beyond traditional boundaries.

Crucially, organisations are moving beyond experimentation and deeply integrating AI into their operational frameworks, optimising workflows, and automating complex decision-making. This shift promises to redefine productivity standards and open new economic frontiers. The commoditization of AI, alongside the rise of accessible, specialised applications, enables companies across sectors to capitalise on machine learning advancements, while data—the fuel of this transformation—is becoming an invaluable asset.

In this period of profound technological change, one certainty stands: businesses that cling to outdated thinking will be left behind. As John Maynard Keynes observed, “The difficulty lies not so much in developing new ideas as in escaping the old ones.” This insight is more relevant than ever, as thriving in the AI age demands a radical rethinking of organisational structures and roles. AI’s impact is already as transformative as the internet’s, reshaping how we interact with technology and each other. The question is no longer whether AI will change the world—it already has. Now, the challenge is how quickly we embrace this shift and what we’re willing to leave behind to make room for the future.

OUR 2025 PREDICTIONS

Following a year of tangible progress, 2025 emerges as a moment when once-theoretical technologies begin moving into concrete reality. Quantum sensing breaks free from research labs, edging into practical applications with enterprise investment and government support at unprecedented levels. Multimodal AI's fusion of text, images, and audio ushers in richer, more intuitive interactions that redefine entire markets. Meanwhile, agentic AI takes its first careful steps beyond controlled pilots, hinting at a future where intelligence acts independently to solve complex problems. Against this backdrop, businesses and industries recalibrate around trust, ethics, and infrastructure—both on Earth and in orbit—to ensure that innovation not only advances but endures. Here's what's in store for 2025.

1: Multimodal AI Reshapes Industries and Redefines Human-Technology Collaboration

- Multimodal AI adoption in industries improves user experiences and operational efficiency by up to 20%.

2: Agentic AI Advances in Niche Use Cases, While Broader Implementation Lags

- Agentic AI excels in niche areas but faces scalability and transparency issues in broader deployments.

3: Enabling Technologies make quantum practical

- Increased government spending, growing enterprise interest, and advances in enabling technologies will drive quantum devices, such as sensors, into practical applications.

4: The Year Robots Leave the Labs and Enter Our Lives

- Adaptive robots and drones transform logistics, healthcare, and hospitality, reducing errors and boosting efficiency.

5: The Evolution of Voice User Interfaces Enhancing How We Work, Live, and Learn

- Voice assistants become context-aware, improving user experiences in healthcare, education, and personal productivity.

6: The Convergence of Digital Identity and AI Governance Will Redefine Trust and Security

- Biometric IDs and governance frameworks strengthen security, privacy, and compliance across critical industries.

7: Self-Driven AI Transforms Cybersecurity

- AI-powered cybersecurity reduces threat response times and enables autonomous, human-on-the-loop defenses.

8: Data Integration Tools to Drive Enterprise AI Adoption

- AI-enhanced data platforms streamline processes, reducing manual tasks and driving smarter decision-making.

9: Cybersecurity Mesh for Enhanced Security

- AI-powered cybersecurity mesh improves multi-cloud protection with adaptive responses and breach containment.

10: Growing Threats in Space Demand Public-Private Collaboration and Dual-Use Funding

- Satellite growth drives innovation in traffic management, debris removal, orbital security, and national defense.

Recap of GP Bullhound's

2024 PREDICTIONS

Reflecting on 2024, GP Bullhound's predictions successfully anticipated pivotal trends that shaped technology and business. This year demonstrated the transformative power of innovation, with specialised AI models proving that smaller can be mightier, making advanced capabilities more accessible across industries. The private sector spearheaded a new era in space exploration, building orbital infrastructure critical for communications and sustainability. Meanwhile, legacy data emerged as a key driver of acquisitions, unlocking new value through AI-driven insights, while advancements in compliance technology brought financial integrity into sharper focus.

Challenges tempered some expectations, particularly in immersive education, where economic headwinds and content shortages slowed adoption. Yet, the importance of authenticity stood out, with creators and businesses reinforcing trust in a world increasingly influenced by AI. As we assess the trends, triumphs, and lessons of 2024, here's how each of GP Bullhound's predictions materialised over the year:

LARGE LANGUAGE MODELS BECOME SMALLER, DISRUPTING THE AI MARKET

YES

The prediction that smaller models would yield competitive results and lower barriers materialised in 2024. Specialised generative models tailored to specific industries and functions gained traction, with Meta's LLaMA models exemplifying this trend. LLaMA 3's 70B parameter model, for instance, achieved performance comparable to OpenAI's GPT-4 (1.76 trillion parameters) but with significantly fewer resources. This shift has made advanced AI more accessible and cost-effective across sectors.

BITS TO BILLIONS: LEGACY DATA SPURS ACQUISITION BOOM

YES

The value of legacy data fueled a surge in acquisitions as companies leveraged AI to extract insights from untapped datasets. In 2024, this trend drove major M&A activity, highlighted by Reddit's $60 million annual deal with Google, granting real-time access to its data for training AI models. The technology, media, and telecommunications sectors saw a 36% increase in deal value in the first nine months of 2024 compared to the same period in 2023.

PRIVATE SECTOR TO SPEARHEAD SPACE REVITALIZATION

YES

The private sector led a new space race, with companies investing heavily in satellite networks, Earth observation, and orbital infrastructure. This expansion marked a milestone, as space-based assets became essential for industries ranging from communications to climate monitoring. Space startups secured $1.9 billion in funding in the third quarter of 2024, an 18% increase from 2023, driven by capital-intensive projects such as rocket launchers and satellite manufacturing. The year also set a record for launches, with 41 in the first two months, highlighting global momentum with major maiden flights from the U.S., China, and Japan.

THE RISE OF AUTHENTICITY AS CREATORS CHALLENGE AI

YES

In 2024, the emphasis on authenticity in creative work was underscored by significant developments. Adobe introduced the Content Authenticity web app, enabling creators to attach Content Credentials to their work, thereby enhancing transparency and attribution. Similarly, YouTube launched AI detection tools, including synthetic-singing identification and deepfake detection, to help creators protect their content from unauthorised AI-generated imitations. A 2024 report by Boston Consulting Group revealed that 78% of consumers preferred human-created content over AI-generated material, highlighting the demand for genuine experiences and the importance of such tools in maintaining trust.

AR/VR & AI FUEL A SURGE IN IMMERSIVE EDUCATION INVESTMENTS

NO

The anticipated surge in immersive education investments driven by AR, VR, and AI in 2024 faced significant challenges that slowed its expected adoption. Global shipments of AR/VR headsets experienced a substantial year-over-year decline of 67.4% in the first quarter of 2024, indicating reduced market momentum. Additionally, economic uncertainties played a major role, as organisations exercised caution and delayed investments in emerging technologies like AR and VR. Finally, limited availability of compelling and diverse content further hindered the widespread adoption of AR/VR in educational settings.

APPLE'S EXPANDED SUBSCRIPTION SERVICE WITH AD-FREE SEARCH ENGINE

NO

Apple has not yet launched its own ad-free search engine, but recent developments indicate that this may change in the future. The company continues to receive substantial payments from Google to keep Google Search as the default on Apple devices, with these payments reaching approximately $20 billion in 2022. In August 2024, a federal judge ruled that Google's agreement with Apple to be the default search engine violated antitrust laws. Meanwhile, Apple's focus on AI advancements, such as the introduction of "Apple Intelligence," suggests potential groundwork for future search functionality.

ANTI-MONEY LAUNDERING AND PAYMENT PROTECTIONS COME CENTRE-STAGE

YES

As digital transactions surged in 2024, AML and KYC protocols in cryptocurrency grew in importance. Enhanced compliance solutions emerged to address financial crime risks, helping platforms gain user trust and align with evolving regulations. The UK's FCA prosecuted its first case involving unregistered crypto ATMs processing £2.6 million, while Binance founder Changpeng Zhao was sentenced to four months in the U.S. Key product innovations bolstered compliance efforts, including Microsoft's AI-driven compliance tool via Azure, AWS's blockchain services, and Google Cloud's machine learning platform.

AI IS RESHAPING MEDIA WITH PERSONALISED CONTENT AND ACQUISITIONS

YES

AI is transforming the media landscape, driving personalized content delivery and fueling strategic acquisitions. Spotify's 2024 Wrapped introduced an AI-generated podcast powered by Google's NotebookLM, delivering tailored insights into individual listening habits. Meanwhile, acquisitions like Shutterstock's purchase of Giphy for $53 million and Canva's acquisition of Leonardo.AI highlight the industry's embrace of AI to enhance creative capabilities and content personalization.

AI RACE ESCALATES SEMICONDUCTOR SHORTAGE

YES

The rapid expansion of AI applications has intensified demand for specialized semiconductors, leading to supply constraints. Nvidia, a leading AI chip manufacturer, reported a 94% year-over-year revenue surge in its fiscal third quarter, reaching $35.1 billion, driven by the high demand for its AI-enabling GPU chips. Additionally, Amazon Web Services (AWS) plans to spend over $20 billion on Nvidia chips in 2024, highlighting the escalating demand for AI hardware. These developments underscore the strain on semiconductor supply chains due to the escalating AI race.

ACCELERATION OF CARBON ACCOUNTING AS NEW REGULATIONS LOOM

YES

In 2024, the EU's CSRD and California's emissions laws took effect, driving adoption of automated carbon accounting systems. Valued at $18.52 billion in 2024, the carbon accounting software market is set to grow rapidly. Companies like Salesforce and Microsoft have integrated AI-powered carbon tracking, while Watershed raised $100 million to enhance its emissions-reduction platform.

01

Multimodal AI Reshapes Industries and Redefines Human-Technology Collaboration

By 2025, multimodal AI systems integrating text, images, video, and audio into unified models are set to revolutionize industries by enabling intuitive and impactful human-technology interactions. According to McKinsey & Company, these innovations could unlock $4.4 trillion in annual economic value, driven by gains in productivity, enhanced user experiences, and smarter decision-making.

COMPANIES TO WATCH

aws ANTHROP\C bigdata.com databricks Google DeepMind

Meta AI Microsoft AI Research MISTRAL AI_ NVIDIA OpenAI synthesia

ENHANCED USER EXPERIENCES

Multimodal AI will redefine user experiences by providing a deeper understanding of context. These systems will analyze speech, facial expressions, and text inputs simultaneously, enabling nuanced and responsive interactions. Virtual assistants, powered by these capabilities, will become more intuitive and impactful, transforming customer service into proactive engagement tools, personalizing education at scale, and revolutionizing entertainment by creating highly dynamic and immersive formats. Industries that rely on high customer interaction, such as retail and hospitality, stand to gain significant competitive advantages through these innovations.

STRENGTHENING DECISION-MAKING

In critical sectors such as healthcare and finance, multimodal AI will revolutionize decision-making processes by integrating diverse data modalities. For example, healthcare systems will analyze medical images, patient histories, and genetic data to deliver precise diagnoses and personalized treatment plans. Financial institutions will benefit from advanced predictive analytics and operational optimization. According to the National Bureau of Economic Research, implementing AI technologies across the U.S. healthcare system alone could reduce annual spending by 5% to 10%, equating to approximately $200 billion to $360 billion. These capabilities, combined with similar savings in the financial sector, could save industries billions annually by reducing errors and accelerating strategic insights.

ACCELERATING AI EVOLUTION

The evolution of transformer models and other neural architectures will drive multimodal AI adoption. By 2025, advances in computational hardware and improved algorithms will enable these systems to overcome scalability and accuracy challenges, making them indispensable tools across industries. Research by Accenture underscores that organizations investing in multimodal AI capabilities could outperform their peers by up to 20% in operational efficiency.

BROAD INDUSTRY APPLICATIONS

Multimodal AI will have far-reaching applications across industries by 2025:

- **Retail:** Enhancing customer experiences through real-time sentiment analysis and personalized product recommendations.
- **Education:** Creating immersive learning environments with interactive assessments and AI-powered tutors.
- **Entertainment:** Enabling text-to-image and text-to-video content generation, paving the way for unprecedented creativity in media.

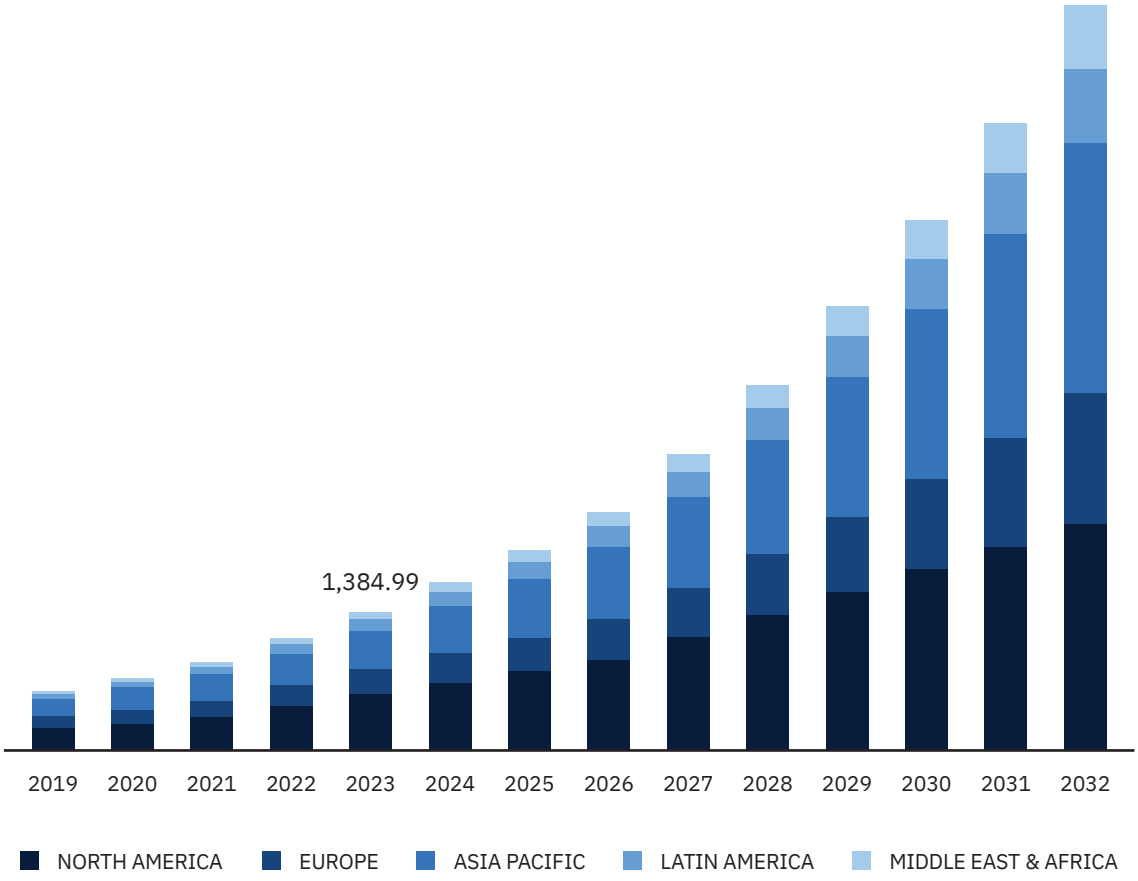
McKinsey’s analysis further identifies multimodal AI as a critical enabler of "experience-centric businesses," predicting that these innovations will significantly boost customer satisfaction and loyalty.

ADDRESSING CHALLENGES AND ETHICAL CONSIDERATIONS

The rapid adoption of multimodal AI will necessitate robust ethical frameworks to address fairness, transparency, and data privacy. Consulting firms like PwC emphasize that ensuring ethical AI is critical for building user trust, especially in sensitive domains like healthcare and finance. By 2025, organizations prioritizing ethical AI development will be better positioned to mitigate biases and enhance user acceptance.

By 2025, multimodal AI systems will not only redefine human-technology interaction but will also become a cornerstone of industry transformation. With their ability to provide seamless, contextually rich experiences and optimize decision-making, these systems will unlock unprecedented innovation and efficiency. As noted by top consultancy firms, organizations that invest in multimodal AI today will not only gain a competitive edge but also shape the technological landscape of the future.

MULTIMODAL AI MARKET SIZE, BY REGION, 2019-2032 (USD MILLION)



Source: Polaris Market Research Analysis

Source: Sparity, Information Week, Restock, McKinsey, PWC

02

Agentic AI Advances in Niche Use Cases, While Broader Implementation Lags

A new class of AI is emerging that moves beyond merely responding to commands—it takes action independently. Unlike traditional AI tools that rely on user prompts, Agentic AI is envisioned to handle complex tasks autonomously, such as analyzing data, predicting outcomes, and even executing decisions. This evolution signals a major shift in AI's role, but real-world implementations remain limited in 2025, constrained by scalability challenges, enterprise caution, and the nascent state of the technology.

COMPANIES TO WATCH

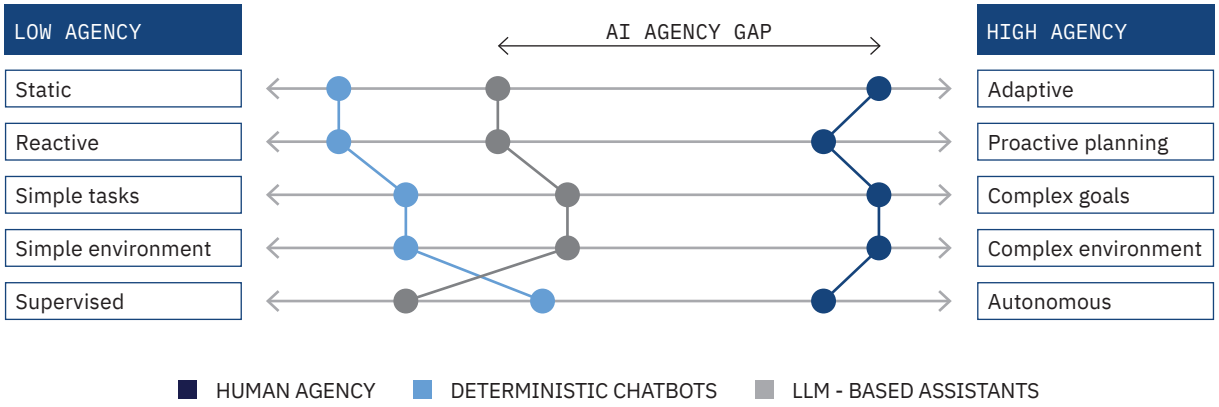
ADEPT agentic AgentOps.ai ANTHROP\C bigdata.com

Cognition DeepMind OpenAI <> SuperAGI H

We are entering the era of Agentic AI, a form of artificial intelligence that doesn't just respond to human commands—it takes proactive, independent action. Unlike traditional AI models that require prompts, Agentic AI autonomously handles complex tasks, predicts outcomes, executes decisions, and learns from every interaction. However, despite these advancements, Agentic AI is primarily in the exploration phase. By 2025, only 25% of large enterprises are expected to deploy AI agents for business-critical tasks, up from less than 5% in 2023. This highlights that adoption is accelerating but remains in its infancy. Many organizations remain cautious, citing challenges related to the black-box nature of Agentic AI, which raises concerns about explainability, reliability, and liability, particularly in industries where compliance and transparency are critical.

Today's AI systems excel at generating outputs when prompted, but Gartner predicts that 30% of Generative AI (GenAI) projects will fail to progress beyond proof-of-concept in 2025 due to poor data quality, high costs, and unclear objectives. Similarly, while targeted use cases like supply chain optimization, healthcare resource management, and customer engagement show promise, these successes remain confined to controlled or niche applications rather than broad enterprise deployment. Market projections also emphasize the long road ahead; by 2028, 33% of enterprise software applications will include Agentic AI, enabling 15% of day-to-day work decisions to be made autonomously. In 2025, however, less than 1% of enterprise software will incorporate Agentic AI, underscoring the early-stage nature of the technology.

MIND THE AI AGENCY GAP



Source: Gartner

While real-world impact is limited in 2025, Agentic AI is gaining momentum in high-value niches. In supply chain optimization, Agentic AI is already being used to autonomously manage logistics, analyzing real-time data, optimizing routes, renegotiating vendor contracts, and increasing efficiency without human oversight. Early adopters report efficiency gains of 15–30%, though scaling these results beyond pilot programs remains challenging. Similarly, in healthcare, Agentic AI has shown promise in dynamically managing hospital staffing and resource allocation, improving operational efficiency and freeing up medical staff for patient care. A 2024 Microsoft Research study highlights that Agentic AI has improved patient outcomes by 15% in pilot implementations. In customer engagement, AI agents are independently handling complex queries, delivering personalized experiences, and reducing manual workloads by up to 25% in successful pilot deployments.

Agentic AI represents a convergence of machine learning, reinforcement learning, and large language models (LLMs), designed to function autonomously in dynamic and unpredictable environments. Unlike traditional AIs that assist with tasks, Agentic AI systems independently analyze data, identify opportunities, and take action to maximize outcomes. These systems also possess a unique capacity for contextual understanding, enabling them to adapt to changing conditions and uncertain scenarios. Reinforcement learning further empowers Agentic AI, allowing systems to refine their strategies through trial-and-error methods, a capability demonstrated by DeepMind's AlphaZero, which mastered games like chess and Go. These same principles are now being applied to real-world contexts, including manufacturing optimization and predictive maintenance.

Platforms like Truth Terminal illustrate the potential of AI Agents whilst raising awareness of some of the risks. Developed as an experimental autonomous chatbot that went viral after posting its own content on X (formerly Twitter) it gained significant attention and investment in 2024. This included $50,000 in Bitcoin from Marc Andreessen who later described the AI Agent as the the first major convergence point between AI and crypto.

Although Agentic AI's potential is widely regarded as transformative, the road to full-scale deployment remains fraught with challenges. High development and maintenance costs, combined with scalability barriers, prevent many enterprises from adopting the technology beyond controlled environments. The black-box nature of Agentic AI systems also raises significant concerns about transparency and accountability, particularly in industries where regulatory compliance is critical. These limitations mean that, for now, Agentic AI's impact will remain confined to select, high-value use cases.

By 2025, the narrative around Agentic AI will reflect a blend of optimism and scepticism. On the one hand, early successes in areas like supply chain logistics and adaptive customer service will validate its potential and inspire continued investment. On the other hand, the slow pace of scaling and persistent technical challenges will temper expectations, leading many to view Agentic AI as promising but not yet ready for critical tasks. While its real-world implementation remains limited, 2025 will serve as a pivotal year in establishing the foundation for broader adoption. The advancements achieved during this period will bring Agentic AI closer to realizing its potential as a transformative force across industries.

Source: Gartner, Microsoft, McKinsey, Markettechpost, Deloitte, Associated Press, The Times, The Wall Street Journal

03

Enabling Technologies make quantum practical

By the end of 2025, value will have started to significantly accrue at the start of the quantum technology value chain as these enabling technologies start to push the limits of what's possible with today's state of the art technologies.

COMPANIES TO WATCH

ALICE & BOB
AQUARK TECHNOLOGIES
atom computing
Pasqal
Q-CTRL
QBLOX
QEDMA
QUANTINUUM
QUANTUM MACHINES
QUANTWARE
river lane
Vector Atomic Inc.

The quantum market is primed, we're seeing a combination of both supply pushing from the bottom and demand pulling from the top creating the start of a valuable ecosystem. On the supply side, governments around the world have committed >$40 billion worth of spend towards developing quantum technologies, providing valuable support to an industry that still requires nurturing for it to achieve its full potential. Whereas, on the demand side, enterprise spend is increasing, as the risks of the fully developed technology become apparent, the limitations of current compute modalities amongst the rising energy tide of AI are being realised, and the awareness of the power that quantum technologies could provide over current systems for addressing humanities problems rises; as an example, financial services firms are predicted to increase their quantum spend by 4.2x from 2022 to 2025. These two drivers are supporting the expansion of the quantum industry from a nascent one, to one that is starting to address real-world issues, solving problems more efficiently than classical devices and putting prototypes into real-world scenarios.

WHERE QUANTUM VALUE WILL ACCRUE IN THE SHORT TERM

Whilst it may still be too early to pick which underlying QPU modality will be the dominant one, and even harder to pick which within that segment will become the "NVIDIA" of quantum, one thing we know for certain is that the market is expanding. As the ecosystem has matured, the value chain has started to splinter into more distinct parts. The technological barriers to overcome are so hard that companies are starting to realise more progress can be made if they become laser-focused on the part of the stack where they have the most expertise. Thus we have seen a spate of partnerships form over the last year (IBM + Q-CTRL, Rigetti + Q-CTRL, Microsoft + Atom Computing, Google + Quera etc), which we expect to accelerate, where full-stack builders start to outsource parts of their stack development to those with expertise in that specific niche.

The changing market dynamics have accelerated the rise and the ubiquity of companies that provide supporting technologies that push the performance of the hardware far beyond its current capabilities and which can operate across the quantum spectrum, which we refer to as Enabling Technologies. For the investor, we see these technologies as derivatives of the wider quantum market, inexplicably linked to its overall expansion, benefiting from both the government investment that will filter down into the building of more systems (of all types) which they are integrated into and also the more exacting demands of interested corporates that will expect better performing systems.

ENABLING TECHNOLOGIES	QUANTUM SENSING	COMPUTING HARDWARE	APPLICATION SOFTWARE
Derivatives of the wider market, providing technologies that are required by the entire value chain. Auxiliary hardware and software control or optimizing the underlying technologies.	Enhancements of technologies that we use today, but with detection capabilities far beyond classical means. Further along the development chain, with pressing use cases.	The underlying Quantum Processing Units (QPU), Quantum repeaters or interconnects that enable quantum phenomena for computation. Various stages of development, with no clear leader.	The ultimate end user use-cases, where once the underlying hardware is powerful enough will disrupt numerous industries. Quantum algorithms can solve problems beyond what's possible now.
Firm types: ↗ Infrastructure Software ↗ Auxiliary Hardware ↗ Photonics ↗ Integrators	Firm types: ↗ Navigation without GPS ↗ Mineral prospecting and climate monitoring via gravity detection ↗ Biomedical imaging and treatment	Firm types: ↗ QPUs ↗ Quantum networking ↗ Scaling support ↗ New compute modalities	Firm types: ↗ Drug discovery ↗ Materials science ↗ Finance ↗ Cryptography
Set to benefit the most in the current market			

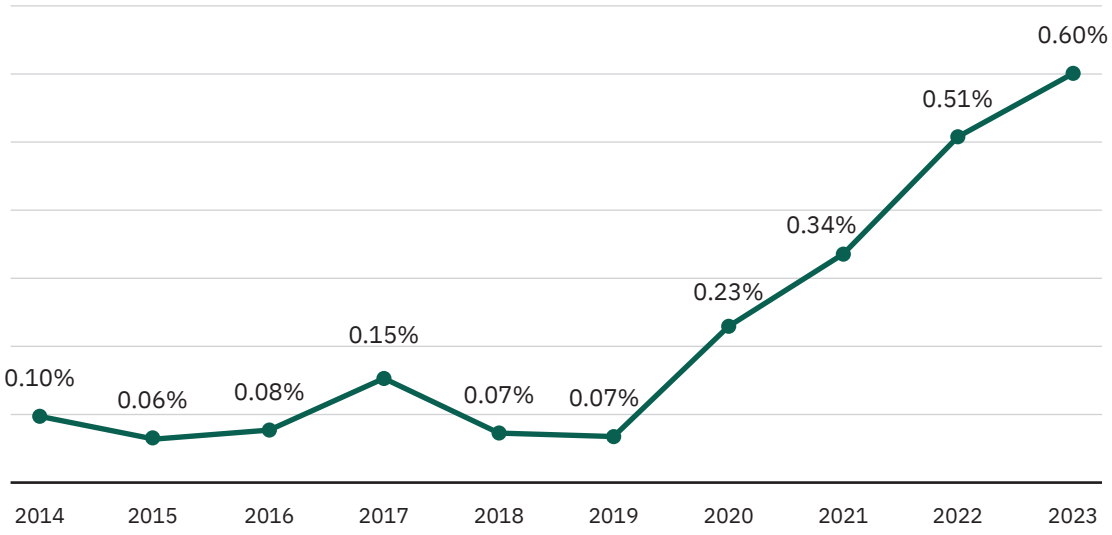
Time to value realisation

ENABLING TECHNOLOGIES AND BEYOND

The companies that make up this initial segment range in their variety from hardware businesses that make the control technologies that stabilise the quantum systems to software businesses that abstract away complexity or help correct the inherent errors which form in the current noisy systems. Due to the nascent nature of the field, they are all unique in their approach, yet similar in their ubiquity across the current market players. These companies tend to generate significant, real revenues, are experiencing explosive growth and yet are closer in their journey to becoming self-sustaining businesses than the full stack developers (even including those who have raised significantly higher volumes of capital). They are able to achieve this because they have the unique benefit of solving real problems directly in the quantum ecosystem today, without the need to wait for the problems that quantum systems might solve in the future. Going further, those that are most attractive and promising within this niche are those whose solution is not solely applicable to quantum computing, but whose technology can be easily adapted to serve or enhance other quantum systems, such as quantum sensors.

Quantum sensors, in simple terms, are devices that go far beyond the sensitivities of the current sensing technology that we use today. They have the potential to replace GPS, enhance natural resource discovery and bring forward early disease detection by improving diagnostics. Owing to the reduced number of quantum system interactions and more advanced academic understanding, quantum sensors involving, for example, magnetometry, single photon detection and gravimetry can be more readily controlled or enhanced by the Enabling Technologies mentioned above. Thus, devices combining these two parts of the value chain are significantly advancing in their commercial journeys with prototypes and PoC tests well underway.

QUANTUM COMPANIES' SHARE OF TOTAL STARTUP FUNDING BY YEAR



SECTOR FUNDING AND 2025 OUTLOOK

The recently announced technological advancements across the quantum ecosystem and the rapidly maturing Enabling Technology companies will fuel further the usefulness and practicality of quantum computers in operation today, bringing them ever closer to solving real-world problems. Whilst, quietly and in the realms of defence and aerospace, quantum sensors (supported by the Enabling Technologies) will start to be integrated into live systems pushing the boundaries of what was physically impossible only a few years ago. These two features will increase the excitement and expectation in the ecosystem, continuing and accelerating the trend (identified by GP Bullhound) of increasing the share of total startup funding that they command. Thus we see 2025 as having two credible measures of success in quantum:

1. **Funding the revolution:** Total funds raised in the sector will be the biggest yet, surpassing even the frothy SPAC-fueled days of 2021, engaging the flywheel to support further innovation and help build out supply chains, paving the industry for future success.
2. **Uncharted territory:** At least one major transport or defense organization will adopt a quantum navigation protocol, initiating the end of the reliance on GPS.

This progress will provide definitive markers for answering whether 2025 has been the year quantum technology transitioned from concept to practical use.

Source: Deloitte, GP Bullhound Quantum Technology, “Investing at the inflection point”

04

The Year Robots Leave the Labs and Enter Our Lives

The era of robotics and autonomous systems is accelerating rapidly, with projections indicating that by 2025, we will witness a "golden age" driven by the seamless integration of hardware and software, alongside growing adoption of technologies such as self-driving vehicles, humanoid robots, and automated systems. According to McKinsey & Company, automation could deliver global productivity gains worth up to $3 trillion annually, with robotics playing a central role in reshaping industries. The global robotics market is projected to reach $74.1 billion by 2026, underscoring the transformative potential of these advancements.

COMPANIES TO WATCH

THE FOUNDATION OF SCALABILITY

This growth is underpinned by innovations in general-purpose technologies that integrate advanced hardware with software, making solutions increasingly scalable, sustainable, and cost-effective. For instance, Tesla's Optimus humanoid robot has become a symbol of this integration, designed to perform complex, repetitive tasks in diverse environments. With its potential to scale across industries, Optimus has shifted from a proof-of-concept to a real-world integration phase, exemplifying how humanoid robotics is transitioning to mainstream use.

Similarly, companies such as Boston Dynamics and Agility Robotics are setting benchmarks in dynamic, human-like movements and multitasking capabilities, driving the appeal of autonomous systems across sectors. Meanwhile, advancements in the Internet of Things (IoT) powered by AI are enabling connected devices to communicate more effectively, generating valuable data that enhances robotics' adaptability to real-world environments. Deloitte highlights that AI-driven IoT systems have led to significant operational efficiencies, particularly in industries like manufacturing and logistics.

TRANSFORMATIVE TRENDS ACROSS INDUSTRIES

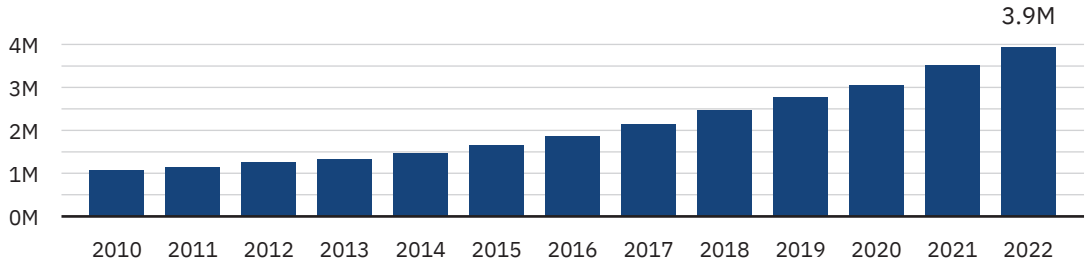
Robotics and autonomous systems are no longer confined to niche applications—they are becoming critical across various sectors:

- **Manufacturing:** Robots like Tesla's Optimus are already being deployed to perform factory floor tasks, reducing workplace hazards and increasing assembly-line efficiency. BCG research estimates that automation in manufacturing could drive a 30% reduction in operating costs by 2030.
- **Healthcare:** Robotic surgery assistants and automated diagnostic systems are revolutionizing healthcare. By 2024, healthcare robots accounted for nearly 20% of new robotics sales, with a PwC study noting their potential to reduce medical errors by up to 50% while enhancing patient care quality.
- **Hospitality and Retail:** Robots are increasingly employed in customer-facing roles, handling tasks such as concierge services, luggage management, and even spa treatments. Market growth is strong, with adoption expected to rise 15% annually through 2025, as per Gartner.
- **Logistics and Supply Chain:** Automation is revolutionizing the logistics sector, with AI and robotics enabling automated warehouses, optimizing delivery routes, and reducing human intervention in high-risk tasks. The logistics robotics market is growing at an impressive annual rate of 27%, as highlighted in a Statista report.

A FUTURE BUILT ON COLLABORATION

The robotics revolution is not happening in isolation; it is being driven by collaborations between industries and technology providers. As Accenture emphasizes, partnerships between robotics manufacturers and AI-driven software companies are vital for accelerating innovation and ensuring the interoperability of systems across industries. In this golden age, robotics and autonomous systems are poised not only to enhance productivity but also to redefine the limits of what is possible in human-machine collaboration, paving the way for a transformative future.

RISE OF THE ROBOTS, GLOBAL OPERATIONAL STOCK OF INDUSTRIAL ROBOTS



Source: International Federation of Robotics

Source: South China Morning Post, Forbes, Seeking Alpha, MIT Technology Review

05

The Evolution of Voice User Interfaces Enhancing How We Work, Live, and Learn

Voice User Interfaces (VUIs) are rapidly transforming how individuals engage with technology, shifting from traditional screen-based interactions to more natural, intuitive, and hands-free methods. This evolution is fueled by advancements in artificial intelligence (AI), enabling VUIs to better understand and respond to human speech in a more contextually aware and personalized manner. Looking ahead to 2025, the integration of AI into VUIs is set to further revolutionize sectors by enhancing convenience, accessibility, and efficiency.

COMPANIES TO WATCH

AGNITIO Voice ID · alexa · Siri · Google Assistant · / kyutai

At the forefront of this transformation is the integration of AI in devices such as smart speakers. Platforms like Amazon Alexa, Google Assistant, and Apple Siri already perform a wide range of tasks, including controlling smart home devices, playing music, creating shopping lists, and providing updates on weather and traffic. By 2025, these platforms are expected to evolve into more sophisticated, context-aware systems capable of anticipating user needs before explicit commands are given. For example, AI-enhanced voice assistants may learn a user's preferred temperature settings, adjust lighting based on mood, or suggest meal ideas based on dietary preferences—all without direct input.

In healthcare, VUIs equipped with AI are set to deliver groundbreaking solutions, especially for elderly individuals and those with mobility challenges. Current voice-activated assistants help patients manage medication schedules, track symptoms, and remind them of doctor appointments. By 2025, these systems will become more intelligent, capable of providing real-time medical advice based on patient data and detecting emotional cues in speech. For instance, an AI-driven healthcare assistant could detect changes in speech patterns indicating discomfort and notify a healthcare provider as needed.

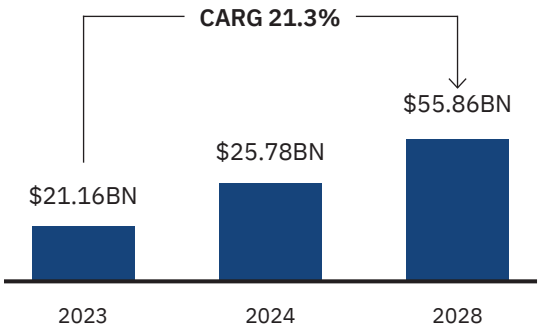
VUIs will also have a profound impact on accessibility, enabling individuals with disabilities to interact with technology more effectively. By 2025, advancements in AI will improve nuanced voice recognition, accommodating speech impairments and non-native accents. Enhanced language models will make these interactions more natural and conversational, empowering users to engage seamlessly with technology.

In education, VUIs will become indispensable for personalized learning. AI-powered systems will track student progress, adapt teaching methods, and provide tailored feedback through verbal interactions. Students will be able to ask questions or clarify concepts, receiving real-time responses customized to their learning pace and style, thereby addressing educational disparities in underserved regions.

By 2025, VUIs will transcend simple commands to understand context, emotion, and intent, making interactions more human-like. These advancements promise to revolutionize not only how we interact with technology but also how it integrates into our daily lives—shaping the future of home automation, healthcare, education, and beyond.

GLOBAL VOICE USER INTERFACE MARKET

EXPECTED MARKET SIZE BY 2028



NORTH AMERICA

Is the largest region in the **voice user interface** market

MAJOR DRIVER

Of the voice user interface is

The rise in the usage of artificial intelligence

KEY TREND

Major companies in the market are developing innovative products, such as Alexa Custom Assistant, to expand the reach of alexa and address developer needs.

Projected Market Growth Chart attached (from the source article listed below). The industry is set to expand from $21.16 billion in 2023 to $25.78 billion in 2024, with a compound annual growth rate (CAGR) of 21.8%, forecasted to reach $55.86 billion in 2028 with a CAGR of 21.3% (Source: The Business Research Company)

Source: The Business Research Company, Allied Market Research

06

The Convergence of Digital Identity and AI Governance Will Redefine Trust and Security

As technology evolves, the importance of secure and ethical practices becomes paramount. Two critical domains—digital identity solutions and AI governance—stand out as areas of rapid innovation and regulatory focus. Both fields address pressing challenges in privacy, security; and trust while unlocking new economic and operational possibilities.

COMPANIES TO WATCH

ENTRUST fiddler ForgeRock Google IBM

IDEMIA incode Microsoft / OpenAI truera

VeriDas

DIGITAL IDENTITY SOLUTIONS: ENABLING A SECURE FUTURE

The global shift toward digitization has intensified the demand for homogenized, seamless and easily accessible digital identity solutions. By 2025, digital identity solutions are expected to revolutionize how individuals and organizations manage online credentials, providing more frictionless authentication with heightened security. Key advancements include:

1. **Biometric Authentication:** Fingerprints, facial recognition, and voice identification are becoming standard tools for verifying identity. These methods offer superior security compared to traditional passwords. Financial services and healthcare firms in particular have quickly adapted to these authentication protocols. (VsecureLabs).
2. **Decentralized Identity Systems:** Blockchain-based solutions seek to empower users to control their digital identities without relying on centralized repositories, reducing vulnerability to security breaches and data theft through decentralization (VsecureLabs).

MARKET GROWTH

The digital identity market is projected to grow from $42.12 billion in 2024 to $183.19 billion by 2030, driven by the demand for secure authentication methods and integration with digital wallets (MarketsandMarkets). (See Figure 1)

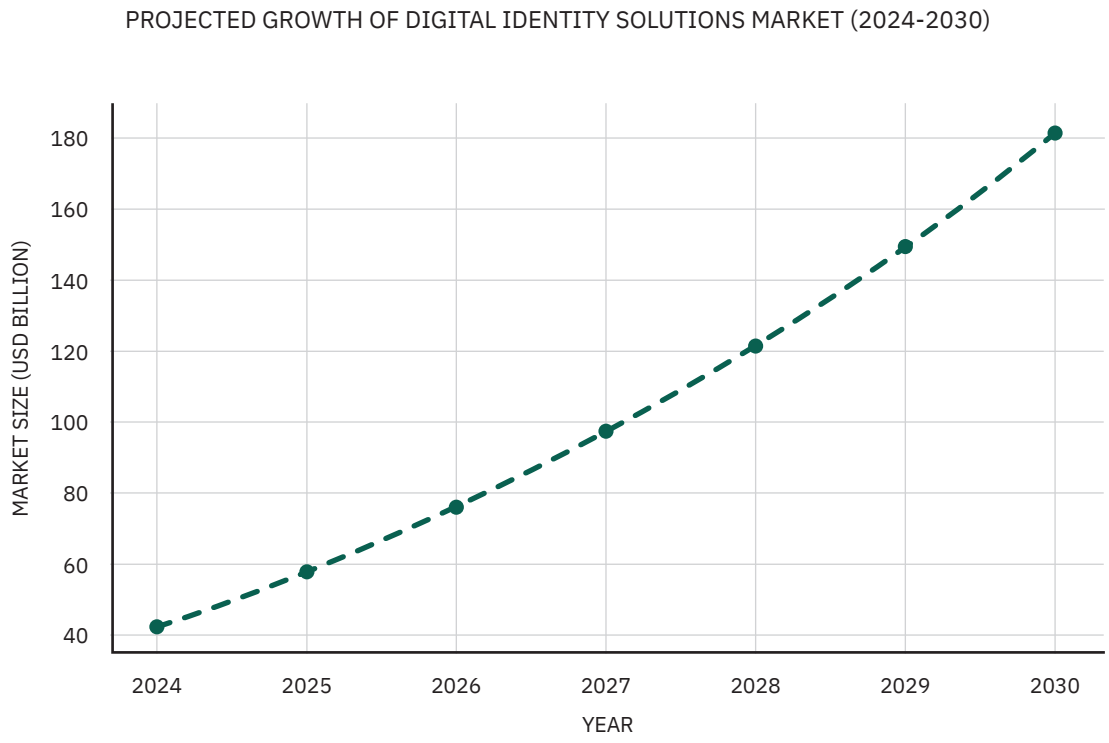


Figure 1: Projected Growth of Digital Indentity Solutions Market (2024-2030)

ARTIFICIAL INTELLIGENCE REGULATION AND GOVERNANCE

The transformative potential of AI brings tremendous growth opportunities alongside ethical and operational challenges. As AI integration takes hold within key sectors like healthcare, finance, and public safety, governance frameworks are essential to mitigate risk factors across the board.

1. **Global Regulatory Efforts:** Countries such as the UK are leading legislative efforts on AI regulation including AI-specific safety institutes and policies to address societal concerns and encourage responsible AI development from organizations (Financial Times).
2. **Ethical AI Platforms:** Businesses are leveraging AI governance tools to ensure proper and ethical deployment, mitigate inherent biases, and comply with evolving privacy laws and regulatory frameworks such as GDPR in the EU (Gartner).
3. **International Standards:** Collaborative global efforts such as the 2025 International AI Standards Summit aim to unify approaches for safe and restrictive AI practices (ISO).

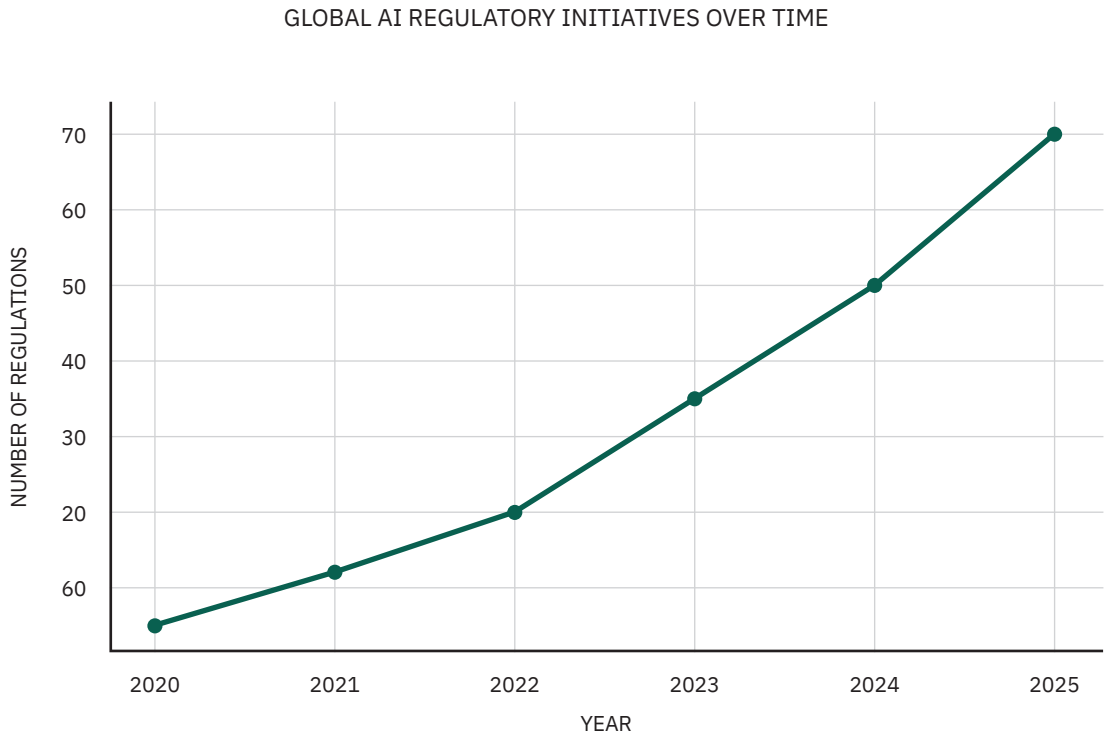


Figure 2: Global AI Regulatory Initiatives Over Time (2020-2025)

Digital identity solutions and AI governance represent pivotal narratives in the technology industry. While digital identity frameworks enhance security and streamline interactions, robust AI regulations ensure ethical and transparent innovation. Together, these advancements are foundational for building a trustworthy and sustainable digital ecosystem.

Source: The Times, Financial Times, Gartner, ISO, Markets and Markets, VsecureLabs

07

Self-Driven AI Transforms Cybersecurity

The rise of AI presents a range of challenges within cybersecurity, as malicious actors equip themselves with increasingly sophisticated offensive tools, and AI implementation continues to expose additional vulnerabilities. This has led to an alarming evolution in the complexity of the cybersecurity landscape, necessitating an equally strong drive for innovative and proactive protection solutions. This dynamic is expected to catalyse the large-scale adoption of self-driven, human-on-the-loop AI cybersecurity algorithms by 2025, aimed at proactively addressing these threats.

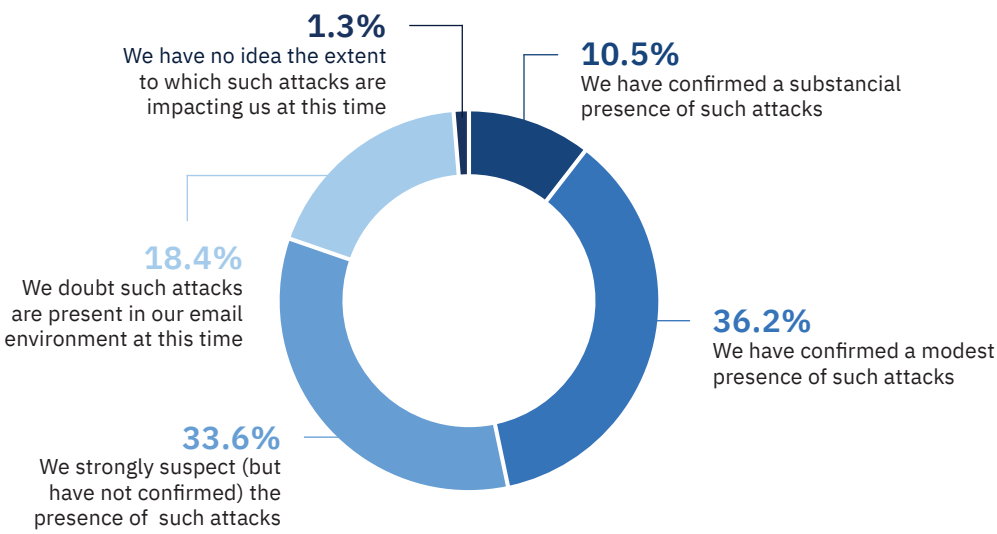
COMPANIES TO WATCH

Malicious actors are developing AI and large language models to plan and execute scaled malware, phishing, network- and web-based, and zero-day attacks. These threats are already taking shape: ransomware powered by AI can deliver attacks faster and with greater precision than ever before; phishing emails arrive with flawless AI-generated grammar, incorporate detection-evading technologies, and are often followed up with near-human-like "vishing" audio. Compounding these risks, the world is undergoing a massive infrastructure transition to deploy AI, often prioritising speed over the development of robust, defensible frameworks, thereby exposing significant vulnerabilities. In the face of these threats, there is increasing regulatory pressure and the imposition of stricter cybersecurity insurance policies. Organisations of all kinds will feel the need to adapt swiftly, but none will shoulder the burden more than cybersecurity providers.

In October 2024, Google's "Big Sleep" initiative uncovered the first previously unknown, exploitable memory-safety issue in widely used real-world software—achieved solely through an algorithm. This marks a historic milestone, as cybersecurity algorithms have traditionally been limited to identifying vulnerabilities in closed-loop environments or hybrid human-AI systems. While a few competitors have claimed to identify zero-day vulnerabilities with algorithms, these efforts typically target already-known flaws or non-real-world use cases. This breakthrough opens significant opportunities to address gaps where fuzzing defence capabilities fall short, ultimately fostering a safer cyber environment. Currently, AI-driven SOC (Security Operations Centre) “co-pilots” act as virtual assistants, analysing data, prioritising threats, and providing actionable insights. We predict a transition from these "co-pilots", with humans in the loop, to algorithms with enhanced automation capabilities, where humans remain on the loop, overseeing systems that perform advanced functions with minimal intervention. Cybersecurity research firms are also shifting to using large language models (LLMs) for vulnerability research tasks, replicating and executing work traditionally handled by human researchers. This will significantly boost efficiency by automating repetitive tasks such as alert triage, data enrichment, and threat correlation, leading to reduced false positives, faster response times, and improved analyst productivity.

On another front, the world faces a race against time to prepare for Y2Q—the future moment when quantum computing will render current public-key cryptography vulnerable. Nicknamed in reference to Y2K, which drove widespread media hysteria but ultimately amounted to little, Y2Q represents a real and profoundly impactful threat. While sceptics initially dismissed the concept as speculative, expert opinions have shifted from questioning if it will happen to when. Although we do not anticipate Y2Q occurring in 2025—as the common refrain goes, “quantum computing is always five years away from being five years away”—its eventual arrival could trigger financial, security, and technological catastrophes orders of magnitude worse than any existing cybercrime. As this threat begins to materialise, defensive actions will initially focus on protecting critical infrastructure and networks, eventually extending to broader commercial systems. This will necessitate a shift from standard security frameworks to tailored AI systems capable of understanding and addressing the unique threats and infrastructures they protect. The more effectively LLMs can operate with minimal oversight, the better they will be able to customise protections and elevate global cybersecurity standards.

LEVEL OF EXPOSURE TO AI-GENERATED EMAIL ATTACKS



Source: Checkpoint, Google Cloud, Abnormal Security, Garnter

08

Data Integration Tools to Drive Enterprise AI Adoption

By 2025, data integration tools will be pivotal in driving Enterprise AI adaptation, enabling organizations to unify fragmented data sources, streamline workflows, and implement intelligent decision-making at scale. As enterprises face the challenges of massive data generation, the ability to efficiently manage, process, and analyze data across diverse environments will unlock the full potential of AI-driven innovation.

COMPANIES TO WATCH

adverity
aws Glue
data iku
Fivetran
Google Cloud Data Fusion
Informatica
matillion
PEAK
quantexa
SCALITY
snowflake
STRATIO
talend A Qlik Company
xiatech

MARKET DYNAMICS FUELING GROWTH

The global data integration market is expected to grow by USD 10.94 billion between 2024 and 2028, driven by the increasing need for seamless data synchronization across multicloud and hybrid ecosystems. AI-powered data integration has evolved from being a complementary capability to a critical requirement for enterprises to remain competitive in an accelerating digital landscape. According to Gartner, manual data integration tasks will decline by 30% by 2026 due to AI-augmented frameworks, and organizations without multicloud integration capabilities will lose 50% of their market share, highlighting the need for scalable and adaptive solutions.

AI-AUGMENTED TOOLS: TRANSFORMING INTEGRATION

Modern data integration tools now incorporate AI to revolutionize how businesses interact with and utilize data. These platforms provide real-time data streaming for immediate insights, AI-driven self-healing pipelines that reduce downtime, and active metadata management that automates tasks such as data lineage and quality governance. Tools like Informatica's CLAIRE engine and Talend's semantic-based quality solutions are prime examples of how AI-enhanced integration workflows simplify complexity, automate repetitive processes, and enable actionable insights.

INNOVATIVE SOLUTIONS DRIVING ADOPTION

Organizations like Adverity, Matillion, Quantexa, and Peak.ai exemplify the innovative solutions driving the adoption of advanced data integration tools. Adverity enhances marketing performance by automating data integration and governance, providing AI-powered transformations that allow users to describe desired data manipulations in plain English, with the system generating appropriate code and detailed instructions. Matillion improves workflows with AI-driven features, including AI Prompt components that enable data engineers to leverage prompt engineering when designing data pipelines, facilitating data transformation through natural language inputs. Quantexa unifies data across disparate systems to power decision intelligence, applying composite AI techniques within its platform to solve a wide range of business problems more efficiently. Companies like Peak.ai focus on operational AI, helping businesses scale decision intelligence across functions.

PREDICTIONS FOR ENTERPRISE IMPACT BY 2025

Data fabric architectures integrating active metadata and AI will become the norm, allowing enterprises to unify distributed data landscapes and accelerate time-to-insights. In healthcare, AI-powered integration will drive precision medicine and predictive analytics, enhancing patient outcomes and operational efficiency. Financial services will benefit from intelligent risk modeling and real-time fraud detection, while retail and logistics will achieve cost reductions of up to 30% through predictive supply chain management and personalized customer engagement.

EMPOWERING CITIZEN DATA INTEGRATORS

The rise of low- and no-code platforms will democratize data integration, empowering non-technical employees to contribute to data workflows. These tools will reduce reliance on highly specialized IT roles, fostering a culture of agility and accelerating AI adaptation across organizations.

OVERCOMING CHALLENGES

Despite the promise of AI-augmented integration, organizations must address challenges such as data privacy compliance, integration complexity, and workforce skill gaps. Investments in robust regulatory frameworks, scalable AI infrastructure, and employee training will be critical to overcoming these hurdles and maximizing ROI.

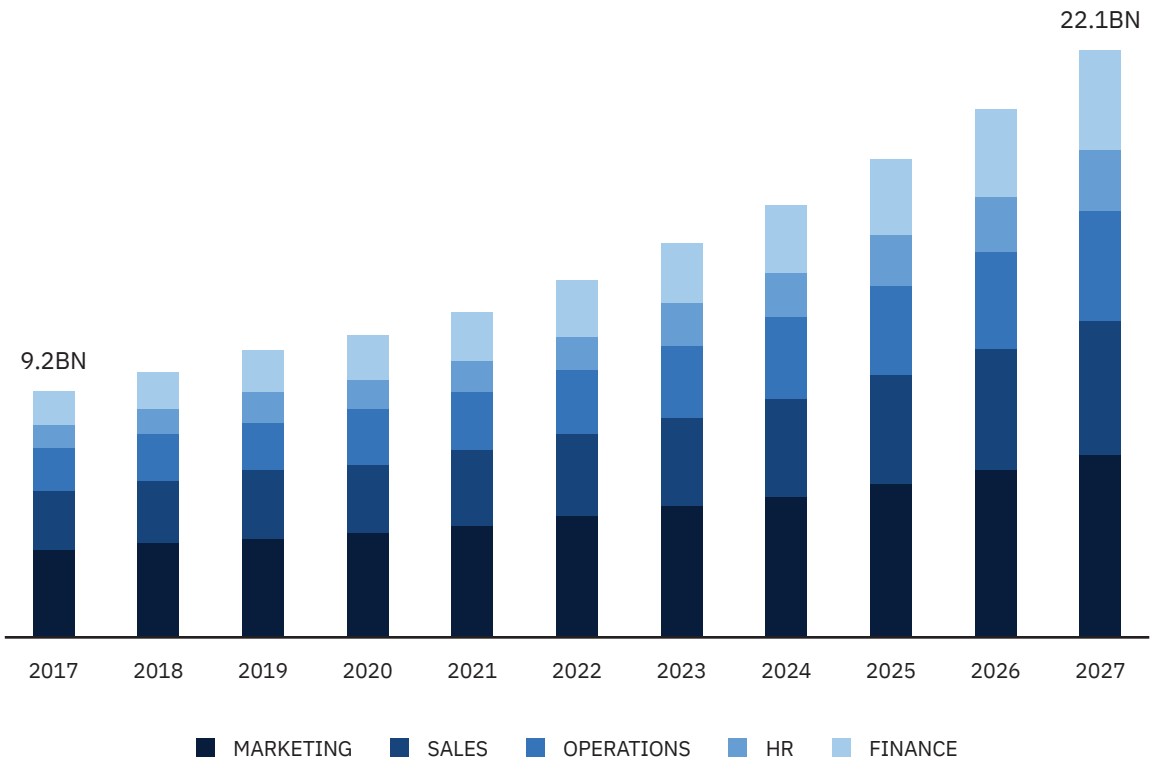
THE COMPETITIVE EDGE

Enterprises that embrace AI-driven data integration tools are expected to achieve a 20% increase in profitability by 2025, according to Deloitte. Enhanced resilience, faster decision-making, and improved operational efficiency will position these organizations as leaders in their industries. Success stories across sectors demonstrate the transformative potential of these tools: predictive analytics in healthcare reduces diagnostic errors, inventory optimization in retail lowers costs by up to 30%, and real-time route optimization in logistics improves delivery efficiency.

CONCLUSION: A FUTURE BUILT ON DATA INTEGRATION

By 2025, data integration tools will transcend their traditional role to become enablers of intelligent ecosystems that drive agility, innovation, and scalability. Enterprises that adapt and invest in these transformative platforms will thrive, leveraging data as a strategic asset in an increasingly complex and competitive global marketplace.

DATA INTEGRATION MARKET SIZE, BY BUSINESS APPLICATION, 2017-2027



Source: www.kbvresearch.com

Source: The Wall Street Journal, Matillion, The Wall Street Journal, Google Blog, McKinsey

09

Cybersecurity Mesh for Enhanced Security

As cyber threats become increasingly sophisticated, businesses and organizations are rethinking their security strategies. Traditional perimeter-based defenses, such as firewalls and antivirus software, are proving inadequate against advanced attacks. The cybersecurity mesh framework (CSMF) provides a decentralized, distributed architecture that enhances security by ensuring breaches in one part of the network do not compromise the entire system.

COMPANIES TO WATCH

The CSMF applies security across interconnected devices, systems, and applications, creating layers of defense that minimize the risk of a single point of failure. This approach is particularly effective for organizations with multi-cloud environments and remote workforces, where data and applications are spread across diverse locations. For example, J.P. Morgan Chase has adopted a cybersecurity mesh to safeguard its vast network, ensuring its infrastructure remains resilient against evolving threats.

The sophistication of cyberattacks, such as advanced persistent threats (APTs), ransomware, and zero-day exploits, highlights the need for more adaptive security measures. High-profile breaches, like the SolarWinds attack in 2020, underscore the vulnerabilities of traditional systems. The cybersecurity mesh framework addresses these challenges through AI-powered systems capable of analyzing vast amounts of data, detecting anomalies, and identifying patterns that indicate potential breaches. Machine learning algorithms enable continuous improvement in detecting and mitigating threats, such as new forms of malware or phishing attacks.

By 2025, AI-enhanced cybersecurity mesh systems will automatically adjust defenses based on real-time intelligence, making them more proactive and less reliant on human intervention. This adaptability will be especially beneficial for industries like finance, healthcare, and government, which handle sensitive information and require stringent data security and compliance measures.

The integration of AI with the cybersecurity mesh framework represents a significant leap in the fight against cyber threats. This scalable and adaptable security model will enable organizations to respond rapidly to threats, minimize breach impacts, and enhance the resilience of digital infrastructure. As organizations continue to adopt this framework, they will benefit from stronger defenses, reduced downtime, and increased trust from clients and customers. The cybersecurity mesh framework, empowered by AI, is poised to become a cornerstone of modern cybersecurity strategies, ensuring robust protection in 2025 and beyond.

GLOBAL CYBERSECURITY MESH MARKET OVERVIEW

North America is estimated to hold the largest market share in the global cybersecurity mesh market in 2023 and Europe is projected to grow at the highest CAGR during the forecast period.

0.9 USD Billion 2023

2.6 USD Billion 2027

CAGR of 28.6%

The global cybersecurity mesh market is expected to grow from USD 0.9 billion in 2023 to USD 2.6 billion in 2027, at a CAGR of 28.6% during the forecast period.

The market growth can be attributed to the increasing need of cybersecurity solution to enhance the perimeter security needs.

Several opportunities such as requirement by organizations for a consolidated cybersecurity solution and growing adoption of multi-cloud strategy are driving the growth in the multi-cloud security market.

The global solutions segment is estimated to grow from USD xx billion in 2023 to USD xx billion by 2027, at a CAGR of xx during the forecast period.

The BFSI vertical offers great opportunities in the cybersecurity mesh market and is expected to grow at the highest CAGR during the forecast period.

Source: Investor Presentation, Secondary Literature, Expert Interviews, and MarketsandMarkets Analysis

Projected Market Growth Chart attached (from the source article listed below) The global cybersecurity mesh market is estimated to reach a valuation of $1.51 billion in 2024, and further expand at a 19.8% CAGR to reach $9.2 billion by 2034 (Fact MR).

Source: Fact.MR, Markets and Markets

10

Growing Threats in Space Demand Public-Private Collaboration and Dual-Use Funding

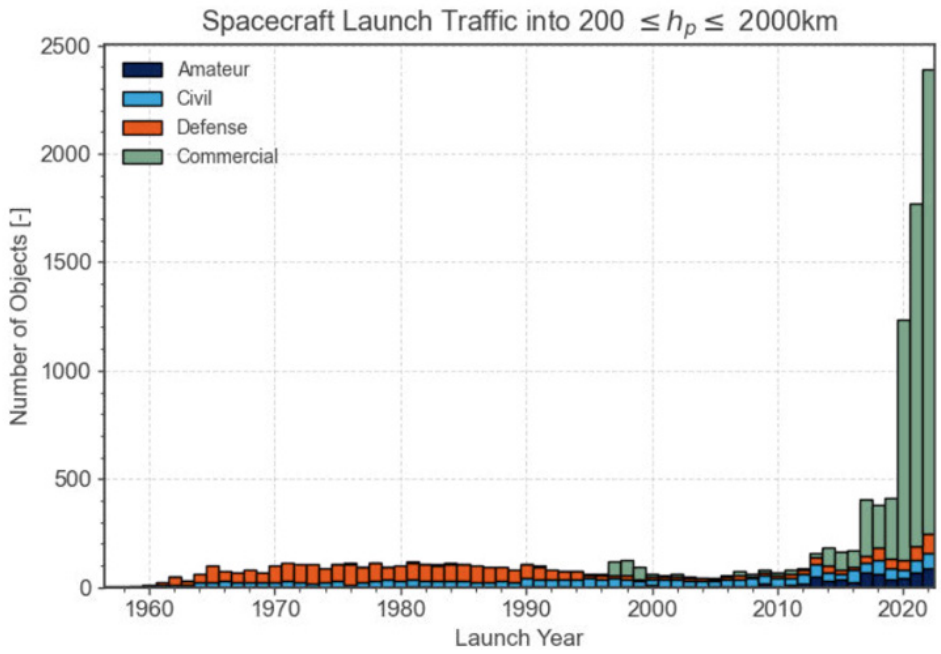
In our 2024 edition, we identified the commercial sector as a driving force in Space Race 2.0. Since then, SpaceX has successfully launched its Starship, reducing launch costs by a factor of 10. The space industry continues to see record funding levels, with $8.5 billion raised over the last 12 months as of June 2024, a 67% increase compared to the previous year.

COMPANIES TO WATCH

ANDURIL
ARRAY LABS
Astroscale
BLUE ORIGIN FOR THE BENEFIT OF EARTH
constellr
DARK
E-SPACE
INFINITE ORBITS
LEOLABS
OKAPI ORBITS
SIERRA SPACE
SPACEX
unseenlabs — THE BRIGHT SIGHT

And while humanity's reliance on space-based systems deepens, so does our exposure to a growing spectrum of threats including debris, cyber threats and space warfare. In parallel, government and the defense sector increasingly depend on space technologies for essential national and military operations. Entering 2025, there is a clear need for stronger regulations and direction set by governing bodies. Collaboration among commercial operators, the military, and allied nations will become essential to secure a resilient and safe space infrastructure.

LAUNCH TRAFFIC INTO LEO BY MISSION CLASS



Source: IADC Report on the Status of the Space Debris Environment

THE EMERGING SPACE INFRASTRUCTURE

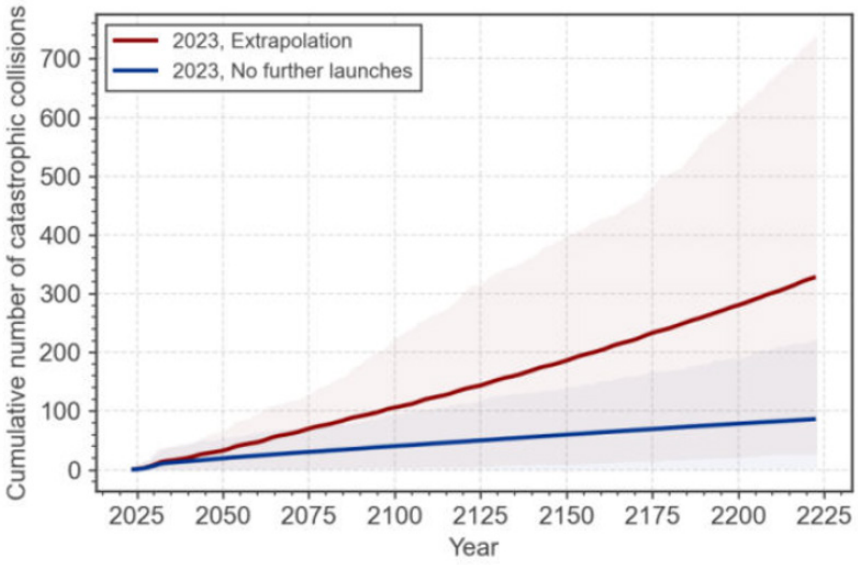
Today's satellites can observe any corner of the world and transmit signals to their recipients in milliseconds. This makes space infrastructure critical not only for communications and navigation but also for emerging civilian and military applications. And just as Earth relies on railways, container ships, and air traffic control, the growing space industry is developing an ecosystem of supporting infrastructure, products, and services:

- **Satellites:** Physical space platforms that now are a fraction of the size and an even smaller fraction of the cost historically, which is the key enabler to more frequent launches.
- **Launch and Ground-Based Infrastructure:** These physical stations manage launch stages, satellite operations, and data transmission. Companies now offer "ground stations as a service" for the increasing number of smaller operators.
- **Software Communication Links and Data Relays:** Embedded systems enable satellites to maneuver around debris, adjust orbits, and retire into graveyard orbits when reaching the end of their lifecycle.
- **Surrounding space environment:** The environment for operations and safety in orbit is expanding with increased objects and debris in space. In terms of operations, orbital platforms and in-orbit servicing is emerging.

A CONGESTED LOW EARTH ORBIT (LEO) REQUIRES TRAFFIC MANAGEMENT

The number of satellites orbiting Earth is expected to grow from approximately 8,000 today to over 100,000 within the next decade. This rapid expansion, coupled with the increasing number of mega-constellations, is creating unprecedented congestion in LEO and complicating orbital operations. Currently, there are an estimated 100 trillion pieces of space debris, including over 900,000 objects larger than 1 cm and 30,000 larger than 10 cm. This poses severe collision risks to operational assets. Simulations predict that, without intervention, catastrophic collisions could increase sevenfold by 2030, with exponential growth thereafter.

NUMBER OF CATASTROPHIC COLLISIONS IN LEO IN SIMULATED SCENARIOS OF THE LONG-TERM EVOLUTION OF THE SPACE ENVIRONMENT



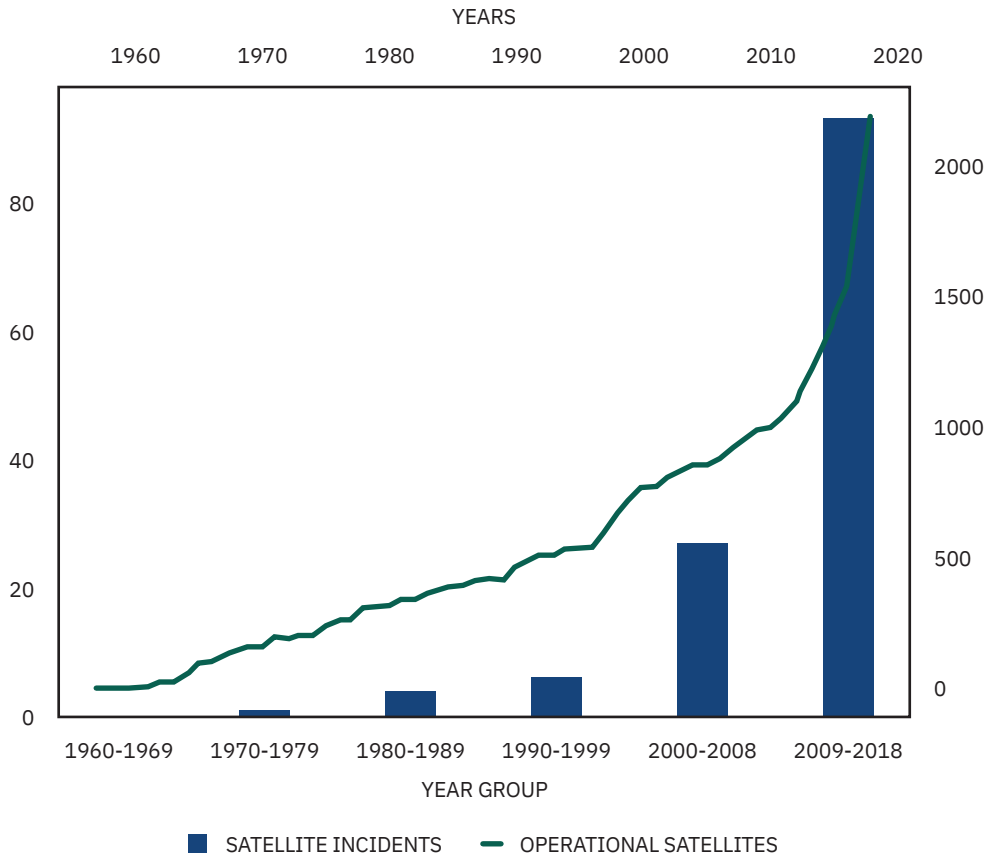
Source: IADC Report

EXPANDING THE DIGITAL BATTLEFIELD INTO ORBIT

As space-based systems become deeply intertwined with Earth's networks, they are becoming a target for hackers and adversarial powers. Satellites, which are difficult to secure post-launch, are vulnerable to a range of cyber threats, from data theft to operational hijacking, as well as growing military threats such as anti-satellite weapons (ASAT) and spionage.

A study of 131 publicly reported satellite-related incidents from 1960 to 2018 found that 62% involved digital infrastructure attacks such as jamming, spoofing, and hijacking. The remaining incidents involved physical thefts, losses, or anti-satellite (ASAT) weapon incidents. The threat of ASAT incidents are expected to grow significantly in the coming period, as we see increased tests and investments into more advanced satellite warfare capabilities from adversaries. This includes for example non-kinetic ASAT weapons that are more suited for disabling satellites through cyber-attacks and jamming.

NUMBER OF SATELLITE ATTACKS BY YEAR GROUP FROM 1960 TO 2018



Source: Cyber Security in New Space Research Paper

STRENGTHENING SPACE RESILIENCE THROUGH PUBLIC-PRIVATE COLLABORATION

As vulnerabilities in space infrastructure grow, so too does its criticality and strategic value for governments and the defense sector - which increasingly depend on space technologies for essential national and military operations. As such, the threats from debris, ASAT weapons and cyberattacks faced by satellite operators are effectively becoming a matter of national security and underscore a growing need for robust defense mechanisms.

Entering 2025, there is a clear need for stronger regulations and direction set by governing bodies. Collaboration among commercial operators, the military, and allied nations will become essential to secure a resilient and safe space infrastructure.

However, a shift towards a more regulated and integrated space economy presents practical challenges. Demanding that commercial operators meet higher resilience and security standards may conflict with their business priorities and intensify funding pressures. At the same time, private-sector frustration with slow governmental processes underscores the need for better alignment and clearer incentives to drive technological progress.

Ongoing initiatives set the fundament for an improved dialogue and cooperative efforts. The U.S. Commercial Augmentation Space Reserve (CASR) aims to integrate commercial space capabilities into allied strategic reserves for crises. NATO's €1 billion startup fund alongside the European Investment Fund's €175 million NewSpace Capital are aligning funding needs and dual-use technologies. Furthermore, initiatives like NATO's Space Centre and the Artemis Accords aim to address defense sector challenges through international cooperation and governance. Companies like Astroscale (debris removal) and LeoLabs (traffic management) are pivotal in enhancing orbital security.

Source: Axford Academic, University of Oxford, Oxford Academic, IEEE.org, Centre for International Governance Innovation, ESA, Oxford Academic

About GP Bullhound

GP Bullhound is a leading technology advisory and investment firm, providing transaction advice and capital to the world's entrepreneurs and founders.

Founded in 1999 in London and Menlo Park, the firm today has 13 offices spanning Europe, the US and Asia. For more information, please visit www.gpbullhound.com.

YEAR FOUNDED 1999	PROFESSIONALS 120	OFFICE LOCATIONS 13
SUCCESSFUL TRANSACTIONS 650+	TRANSACTION VALUE ADVISED ON $50bn	AUM ACROSS GP BULLHOUND MANAGED FUNDS $1bn+

UNITED KINGDOM

London
Manchester

AMERICAS

San Francisco
New York

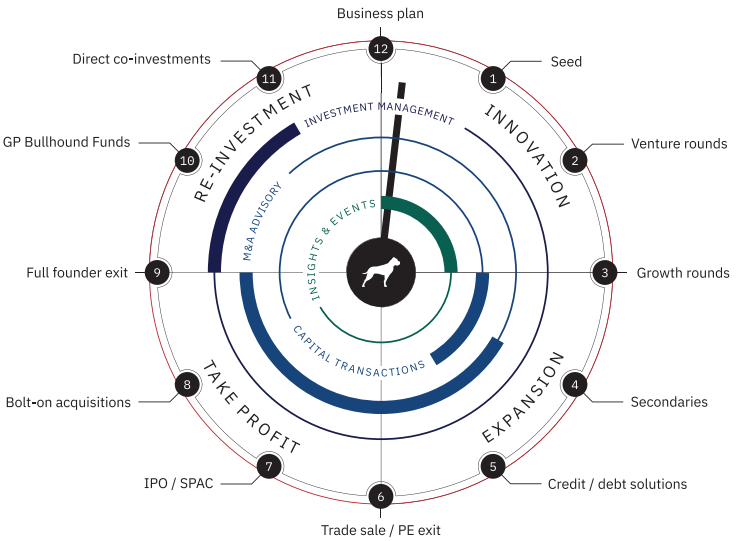
EUROPE

Stockholm
Berlin
Paris
Madrid
Marbella
Luxembourg
Malaga
Frankfurt

ASIA

Kuala Lumpur

GP Bullhound partners with entrepreneurs throughout their founding journey, supporting them with advisory, capital, insights and access to our global network.



Methodology

This report is based on the expert insights of GP Bullhound's worldwide team alongside detailed analysis of investment trends across the global technology landscape. It is intended to provide our predictions for the digital economy in 2025.

Each year, we present a transparent assessment of our predictions from the previous report to maintain a high level of scrutiny on our own research. Conceptually predicting tech of the distant future is in many ways simpler than predicting near-term advancements, but our challenge is identifying which technologies will see the greatest progress and market adoption in the coming 12 months.

Historically, we have highlighted significant trends standing the test of time; e.g. our predictions for IOT, wearables and collaboration tech, as well as critical trends in cybersecurity, cloud and edge computing. Many will continue to evolve, eventually forming the foundation for future tech in years to come.

AUTHORS

GUILLAUME BONNETON
Partner

SVEN RAEYMAEKERS
Partner

ALEXIS SCORER
Partner

JOYCE BYRNE
Vice President

WILL HOLMQUIST
Vice President

RORY KIMMEL
Associate

LUIS ROSALES
Associate

CALLUM STEWART
Investment Associate

NELLY TRANAAS
Investment Associate

HIMAGHNA NAGANDLA
Analyst

ATHINA PAPAGEORGIOU
Analyst

CHRIS YIN
Analyst

Disclaimer

No information set out or referred to in this communication shall form the basis of any contract. The issue of this insights report (the "report") shall not be deemed to be any form of binding offer or commitment on the part of GP Bullhound or any of its affiliates or subsidiaries. This report is provided for use by the intended recipient for information purposes only. It is prepared on the basis that the recipients are sophisticated investors (so-called "professional clients" in the meaning of Annex II of Directive 2014/65/EU on markets in financial instruments, or their equivalent elsewhere) with a high degree of financial sophistication and knowledge. This report and any of its information is not intended for use by private or retail investors in the UK or any other jurisdiction where access, use or availability of this information would be unlawful.

This report does not provide personalised advice or recommendations of any kind. You, as the recipient of this report, acknowledge and agree that no person has nor is held out as having any authority to give any statement, warranty, representation, or undertaking on behalf of GP Bullhound in connection with the contents of this communication. Although the information contained in this report has been prepared in good faith, no representation or warranty, express or implied, is or will be made and no responsibility or liability is or will be accepted by GP Bullhound. In particular, but without prejudice to the generality of the foregoing, no representation or warranty is given as to the accuracy, completeness or reasonableness of any projections, targets, estimates or forecasts contained in this report or in such other written or oral information that may be provided by GP Bullhound. The information in this report may be subject to change at any time without notice. GP Bullhound is under no obligation to provide you with any such updated information. All liability is expressly excluded to the fullest extent permitted by law. Without prejudice to the generality of the foregoing, no party shall have any claim for innocent or negligent misrepresentation based upon any statement in this report or any representation made in relation thereto. Liability (if it would otherwise but for this paragraph have arisen) for death or personal injury caused by the negligence (as defined in Section 65 of the Consumer Rights Act 2015) of GP Bullhound, or any of its respective affiliates, agents or employees, is not hereby excluded nor is damage caused by their fraud or fraudulent misrepresentation.

This report should not be construed in any circumstances as an offer to sell or solicitation of any offer to buy any security or other financial instrument, nor shall they, or the fact of the distribution, form the basis of, or be relied upon in connection with, any contract relating to such action. The information contained in this report has no regard for the specific investment objectives, financial situation or needs of any specific entity and is not a personal recommendation to anyone. Persons reading this report should make their own investment decisions based upon their own financial objectives and financial resources and, if in any doubt, should seek advice from an investment advisor. Past performance of securities is not a guide to future performance and the value of securities may fall as well as rise. In particular, investments in the technology sector may be subject to frequent fluctuations. The information contained in this report is based on materials and sources that are believed to be reliable; however, they have not been independently verified and are not guaranteed as being accurate. The information contained in this report is not intended to be a complete statement or summary of any securities, markets, reports or developments referred to herein.

This report may contain forward-looking statements, which involve risks and uncertainties. Forward-looking information is provided for illustrative purposes only and is not intended to serve as, and must not be relied upon as a guarantee, an assurance, a prediction or a definitive statement of fact or probability. Actual events and circumstances are difficult or impossible to predict and may differ from assumptions. Any and all opinions expressed are current opinions as of the date appearing on the documents included in this report. The information contained in this report should not be relied upon as being an independent or impartial view of the subject matter, and for the purposes of the rules and guidance of the Financial Conduct Authority ("the FCA") and of the Financial Industry Regulatory Authority ("FINRA"), and of the Commission de Surveillance (du Secteur Financier "CSSF"), this report shall not be viewed as a research report and is considered marketing communication and a financial promotion. Thus, in accordance with COBS 12.2.18 of the FCA Handbook, its contents have not been prepared in accordance with legal requirements designed to promote the independence of investment research and it is not subject to any prohibition on dealing ahead of the dissemination of the report.
The GP Bullhound indices and indexes included in this presentation are presented to support the opinions and information on the markets and securities included in this presentation. The GP Bullhound indices or indexes are NOT and should, under no circumstance, be used as indexes, indices or benchmarks in the sense of the EU regulation EU 2016/2011 or the UK Benchmark (Amendment and Transitional Provisions) (EU Exit) Regulations 2019 as amended by the Financial Services (Electronic Money, Payment Services and Miscellaneous Amendments) (EU Exit)

Regulations 2019 (U.K. BMR), hereinafter, the "Regulations". GP Bullhound (including any of its regulated affiliates in the EU or UK) does not issue indexes or benchmarks within the definition of the Regulations, nor acts as manufacturer or administrator of regulated indexes or benchmarks as defined in the Regulations.

Recipients or any reader of this presentation should not use the indices in this presentation as indices or benchmarks for the purposes defined in the Regulations. GP Bullhound (including affiliates) shall not be liable for its incorrect use as indexes or benchmarks subject to the Regulations by recipients, readers or any third party. The individuals who prepared the information contained in this report may be involved in providing other financial services to the company or companies referenced in this report or to other companies who might be said to be competitors of the company or companies referenced in this report. GP Bullhound, through its advisory and asset management departments, does and seeks to do business with companies which are, or may be, covered in this report. As a result, both GP Bullhound and the individual members, directors, officers and/ or employees who prepared the information contained in this report may have responsibilities that conflict with the interests of the persons who access this report.

GP Bullhound and/or connected persons may, from time to time, have positions in, make a market in and/ or effect transactions in any investment or related investment mentioned in this report and may provide financial services to the issuers of such investments. The information contained in this report or any copy of part thereof should not be accessed by a person in any jurisdictions where its access may be restricted by law and persons into whose possession the information in this report comes should inform themselves about, and observe, any such restrictions. Access of the information contained in this report in any such jurisdictions may constitute a violation of UK or US securities law, or the law of any such other jurisdictions. Neither the whole nor any part of the information contained in this report may be duplicated in any form or by any means. Neither should the information contained in this report, or any part thereof, be redistributed or disclosed to anyone without the prior consent of GP Bullhound. GP Bullhound and/or its associated undertakings may from time to-time provide investment advice or other services to or solicit such business from any of the companies referred to in the information contained in this report.

Accordingly, information may be available to GP Bullhound that is not reflected in this material and GP Bullhound may have acted upon or used the information prior to or immediately following its publication. However, no person at GP Bullhound (which includes its members, directors, officers and/or employees), may undertake personal transactions in financial instruments of companies to which this report relates, without receiving prior clearance from the GP Bullhound Compliance Officer or nominated delegates. In addition, GP Bullhound, the members, directors, officers and/or employees thereof and/or any connected persons may have an interest in the securities, warrants, futures, options, derivatives or other financial instrument of any of the companies referred to in this report and may from time-to-time add or dispose of such interests. GP Bullhound Corporate Finance Ltd and GP Bullhound Asset Management Ltd are private limited companies registered in England and Wales, registered numbers 08879134 and 08869750 respectively, and are authorised and regulated by the Financial Conduct Authority. GP Bullhound Luxembourg Sarl is a private limited company, registered in Luxembourg (B-254.845) and authorised and regulated as an Alternative Fund Manager by the CSSF in Luxembourg (A00003217). Any reference to a partner in relation to GP Bullhound is to a member of GP Bullhound or an employee with equivalent standing and qualifications. A list of the members of GP Bullhound is available for inspection at its registered office, GP Bullhound 78 St. James's Street, London SW1A 1JB.

For US Persons: This report is distributed to US persons by GP Bullhound Inc. a broker-dealer registered with the SEC and a member of the FINRA. GP Bullhound Inc. is an affiliate of GP Bullhound Corporate Finance Ltd. All investments bear certain material risks that should be considered in consultation with an investors financial, legal and tax advisors. GP Bullhound Inc. engages in private placement and mergers and acquisitions advisory activities with clients and counterparties in the Technology and CleanTech sectors. In addition, the persons involved in the production of this report certify that no part of their compensation was, or will be, directly or indirectly related to the specific views expressed in this report. As such, no person at GP Bullhound (including its members, directors, officers and/or employees) has received, or is authorised to accept, any inducement, whether monetary or in whatsoever form, in counterparty of promise to issue favorable coverage for the companies to which this report may relate.

GP.Bullhound

LONDON

tel. +44 207 101 7560
78 St James's Street
London SW1A 1JB
United Kingdom

SAN FRANCISCO

tel. +1 415 986 0191
1 Sansome Street, Suite 3630
San Francisco, CA 94104
United States

STOCKHOLM

tel. +46 8 545 074 14
Grev Turegatan 30
114 38 Stockholm
Sweden

BERLIN

tel. +49 30 610 80 6019
Kleine Jaegerstr. 8
10117 Berlin
Germany

MANCHESTER

tel. +44 161 416 5031
ABC Buildings, 21-23 Quay St, 9th Floor
Manchester M3 4AE
United Kingdom

PARIS

tel. +33 1 82 88 43 40
39 Avenue Franklin Delano Roosevelt
75008 Paris
France

MADRID

tel. +34 916 226 917
Paseo de Recoletos 6, 7º Oficina 1
28001 Madrid
Spain

NEW YORK

tel. +1 212 759 1870
489 Fifth Avenue, 34th PH
New York, NY 10017
United States

MARBELLA

tel. +34 677 23 81 64
Av. Bulevar Príncipe Alfonso de Hohenlohe 2,
Planta 1, Oficina 3.7 (The Pool)
29602 Marbella
Spain

LUXEMBOURG

tel. +352 621 653 191
33 Boulevard Prince Henri
1724 Luxembourg
Luxembourg

MALAGA

tel. +34 680 72 64 24
Calle Martinez, 11, 2º
29005 Malaga
Spain

FRANKFURT

tel. +49 152 0236 7485
Grüneburgweg 58-62
Westendtower 7. Stock
60322 Frankfurt
Germany

KUALA LUMPUR

Level 9, Integra Tower 348, Jln Tun Razak,
Kampung Datuk Keramat,
50400 Kuala Lumpur, Wilayah Persekutuan
Kuala Lumpur
Malaysia

Register to receive news, Insights reports
& events invitations from GP Bullhound