
OliverWyman
GFTN
Global Finance & Technology Network
AI AND QUANTUM
Catalyst For Transformative Growth In Financial Services

# FOREWORD

In the ever-evolving landscape of financial technology, global trends indicate a pronounced shift towards the integration of digital innovations. The Singapore FinTech Festival 2024 (SFF2024) marked a pivotal juncture for the exploration of artificial intelligence (AI) and quantum technology as critical levers of transformation. The festival convened 65,000 participants from 134 countries and regions, including a diverse coalition of policymakers and regulators, industry leaders, experts, and innovators, to examine the capabilities of AI and quantum computing. SFF2024 emphasized a clear roadmap for these technologies, offering a vantage point for key stakeholders to discuss their practical applications and potential impact on the industry.

AI emerged as a cornerstone theme. From highlighting real-world use cases in enhancing operational efficiency and customer experiences, to discussing the operationalization and regulation of AI adoption, SFF2024 illuminated the nuanced challenges and vast opportunities associated with deploying AI within the financial services sector.

Discussed at SFF for the first time, the nascent field of quantum technology was explored as a tool capable of transforming financial computations and problem-solving capabilities. However, experts also emphasized its key threat to current cryptographic methods, urging financial institutions to begin preparing for a post-quantum world.

This report captures the essence of the discussions from SFF2024, reflecting on the key trends, opportunities, and challenges of AI and quantum technology to offer a comprehensive view of the future financial technology landscape. As we look towards the rest of 2025, this report invites industry stakeholders to engage with the evolving discourse around these transformative technologies.

Finally, we look forward to welcoming you in late 2025 for the festival's 10th anniversary, where we will bring together the global fintech community to continue exploring, challenging, and driving innovation to shape a future defined by technological advancement and improved financial services.

**Sopnendu Mohanty**

Group Chief Executive Officer, Global Finance & Technology Network (GFTN)

**Gaurav Kwatra**

Partner and Asia Pacific Head of Quotient — AI by Oliver Wyman

# 1

# EXECUTIVE SUMMARY

Considering the rapid advancements in artificial intelligence (AI) adoption and developments in quantum technology, it is no surprise that the theme of '*Roadmap for AI and Quantum*' emerged as a focal point at the Singapore FinTech Festival 2024 (SFF2024). Through various discussion sessions, notable speakers shared trends and insights on how their organizations are navigating the complexities of these technologies, leading to several key observations and takeaways. This report consolidates and reflects on the AI and quantum technology discussions at SFF2024.

**Use of AI in financial services and value capture**

AI's transformative potential to increase efficiency, improve effectiveness, and elevate customer experiences across financial services is already starting to emerge with use cases of varying scales and nature. With generative AI (GenAI), a notable shift in focus is to transition from experimentation to true value-focused approaches that deliver measurable business outcomes. There is also a recognition that the capabilities of predictive AI remain insufficiently tapped for advanced applications, even within organizations at the forefront of technology adoption, particularly in areas such as hyper-personalized products and services.

**The AI operating model**

Merely implementing the latest technology is not enough to unlock the full potential of AI. Achieving success requires a comprehensive operating model that prioritizes solving for the customer, supported by pragmatic prioritization, governance, effective risk management, and organizational readiness. Insights from leading organizations highlight the importance of investing in all components of the AI operating model. This begins with adhering to "user-first" and "customer-first" principles, prioritizing value creation rather than adopting AI for its own sake. Success also hinges on clearly defining the roles of model, data, and AI governance teams within this new, complex, and overlapping ecosystem. Establishing fundamental controls from the outset is crucial for building customer trust.

### Evolution and the role of public-private partnerships

The AI regulatory landscape is rapidly evolving, with regulatory bodies worldwide recognizing the need for strategies that balance innovation and risk management to accelerate AI adoption. International cooperation on AI regulations is beginning to take place, signaling increased regulatory attention on AI. Public-private partnerships have emerged as a vital accelerator of safe AI adoption through the funding and support of various initiatives. Overall, there is an impetus for regulations to serve as catalysts for progress rather than inhibitors to innovation.

### The potential of quantum technology

Although still in its early stages, quantum technology presents both transformative opportunities and significant security challenges for the financial services sector. The industry is currently evaluating the potential and day-to-day role of quantum technology. Many leading institutions are currently in the exploration phase, and limited applications have been realized as significant technological breakthroughs are necessary to unlock the full potential of quantum technology. Nonetheless, experts are advising financial institutions to start preparing for a quantum future, due to the key threat posed by quantum technology in public key cryptography. Therefore, while more work remains to be done, financial institutions should closely monitor quantum advancements and proactively prepare for a post-quantum world.

### Convergence of AI and quantum technology

Quantum technology has the potential to accelerate machine learning and significantly enhance AI's performance. However, substantial challenges remain to be addressed before realizing the full potential of this convergence. As the industry awaits commercialization, there is a sense of anticipation about how the convergence can be achieved.

# 2
# INTRODUCTION

**A brief overview of AI and quantum computing**

AI and quantum computing are two rapidly advancing fields that hold the potential to transform numerous industries, particularly financial services. AI encompasses a wide array of technologies and applications, ranging from predictive analytics and machine learning to natural language processing and content generation. It refers to the capability of machines to perform tasks that typically require human-like intelligence, primarily through pattern recognition and prediction. In recent years, advancements in AI have expanded its capabilities to incorporate aspects of reasoning and learning.

Meanwhile, quantum computing leverages the principles of quantum mechanics to process information in fundamentally different ways than traditional binary computing. Using qubits that can handle multiple calculations at once, quantum computing can perform complex calculations at unprecedented speeds and expand the range of solvable problems.

**The importance of AI and quantum computing in transforming financial services**

The rise of AI and quantum technology is driven by significant advancements in computational capabilities and the availability of large datasets, which have spurred innovation and application across various sectors. In the financial services industry, these technologies are reshaping the landscape by enhancing capabilities such as fraud detection, risk assessment, and personalized customer interactions.

SFF2024 discussions on AI covered a wide range of topics including use cases, critical enablers for success, importance of risk management, and the role of public-private partnerships to boost innovation and adoption. Within GenAI, financial institutions are moving beyond just exploratory AI initiatives to focus on value generation and transformative use cases. However, some advanced applications, such as highly personalized services, remain underdeveloped due to constraints in data quality and complexity challenges, as well as operating model limitations.

To fully harness the potential of AI, organizations need a comprehensive AI-ready operating model, which encompasses four key enablers in governance, risk management, technology, and organizational readiness. In the face of a rapidly evolving global AI regulatory landscape, an effective operating model will allow organizations to manage AI-associated challenges in data security, risk management, and regulatory compliance. SFF2024 experts also discussed the vital role of governments in accelerating AI adoption, through initiatives such as grants, collaborative case studies, promoting education, and regulatory sandboxes.

The inaugural quantum computing discussions at SFF2024 provided critical insights into the technology's potential trajectory, as well as its potential opportunities and threats. While still in its nascent stage, it presents both transformative potential and significant risks for the financial services industry. Although potential applications span fraud detection, portfolio optimization, and enhanced cryptography among others, practical implementations have yet to materialize due to current technical limitations such as stability, scalability, and the need for sophisticated infrastructure. While it is not clear if the industry can overcome these challenges over the next few years, experts remain optimistic and are advocating for proactive preparation, especially given the potential implications the technology poses to cryptography and security. Experts raised concerns of "Harvest Now, Decrypt Later" as a significant threat to data security, where encrypted information harvested today could be decrypted in the future when quantum technologies become advanced enough to break current cryptographic algorithms. This highlights the urgency for organizations to enhance their security measures in anticipation of advancements in quantum computing. Leading organizations have started exploring ways to tap on the opportunities and mitigate the risks of quantum technology, signaling that although there remains more work to be done before the technology takes off, quantum technology should be a watchpoint.

As AI and quantum technology advancements reshape the landscape of the financial services industry, organizations are presented with the opportunity to reinvent themselves. This report harnesses key insights from SFF2024, as well as Oliver Wyman's deep expertise in both the financial services and technology industries, to introduce five calls to action that can help guide organizations to adapt and win in our changing world.

# 3
# KEY THEMES

## A. THE USE OF AI IN FINANCIAL SERVICES AND VALUE CAPTURE

AI adoption in financial services is accelerating, driven by advancements in predictive analytics and machine learning.[1] While financial institutions are still exploring ways to unlock the full value of AI, SFF2024 participants expressed optimism about AI's transformative role for financial services, particularly in **enhancing efficiency, effectiveness, and the overall customer experience**.

**Two key trends have emerged for AI within financial services: First, a shift towards value-based approaches in GenAI adoption; and second, the realization that despite its proven capabilities, predictive AI remains insufficiently tapped due to a combination of data quality and complexity challenges, as well as operating model limitations.**

It is essential to differentiate between the two types of AI as each is characterized by distinct underlying technologies and use cases.

**Exhibit 1: Predictive AI versus GenAI**

| | Predictive AI | Generative AI |
|---|---|---|
| **Description** | Advanced analytical techniques relying on different algorithms and large organized data sets | This includes large language models and multi-modal models which have the power to generate outputs from bodies of data that are usually very large |
| **Types of uses** | Analysis of large datasets to forecast potential scenarios and find outliers | • Interpretation, classification, manipulation, and generation of language content<br>• Generation of content across different data types, such as a combination of audio, code, images, text, and videos |
| **Use case** | AI fraud detection | AI supported code generation |
| **Example task** | Bank wants a faster and more efficient way of identifying fraudulent transactions | Bank wants to write code that can be used to classify digitized banking statements |
| **Model used** | Machine learning fraud detection model | GitHub Copilot |
| **User input** | Specific model parameters<br>*For example: Banking transaction data*<br>(Domain specific and often proprietary datasets) | Free-form prompts (text, image, speech)<br>*For example: "Write function to extract document name"* |
| **Process** | Rules or template-based machine learning approach, such as random decision forests, or a supervised learning algorithm | • Deep learning, large language model<br>• Majority transformer-based<br>*For example: Billions of parameters from publicly available datasets combined with coding languages available in public repositories* |
| **Output** | Classification of outliers and potential cases of fraud | Generation of content<br>*For example: Code suggestions to help a software engineer answer the initial task* |

Source: Oliver Wyman and UK Finance paper, *The Impact Of AI In Financial Services*

## Unlocking potential through value-focused approaches

Organizations are transitioning from experimentation to a value-focused approach by leveraging GenAI through three primary strategies: Point solutions, transformative initiatives, and agentic AI. GenAI is well-known for its point solutions specialized in uplifting the productivity of specific routine tasks, such as by using GitHub Copilot to debug code. Beyond targeting individual tasks, AI can be utilized for more transformative initiatives targeted at complex problems within a particular business area. This involves redesigning workflows and using a combination of predictive AI and GenAI to enhance the complete process, such as in risk and compliance assessments. Finally, organizations are also pursuing AI agent solutions which unlock value by optimizing processes, enhancing efficiency, and driving innovation, while reducing the need for constant human oversight. Adopting a combination of these approaches and building a range of tools available to address different challenges across the organization will maximize the value of AI.

**Exhibit 2: Three approaches to unlock value in GenAI**



| Approach | 1. Point solutions | 2. Transformative initiatives | 3. Agentic AI |
|---|---|---|---|
| **Description** | Improve quality and speed of individual routine internal processes or tasks | Reimagine complex processes with AI embedded across the workflow, combining human intervention with intelligent automation | Interact with users, systems or other AI agents, using natural language, making decisions and executing multi-step tasks with minimal or enforced human intervention, and a level of autonomy, to achieve defined goals |
| **Example high-value use cases (non-exhaustive)** | • Document summarization<br>• Policy simplification and interrogation<br>• Translation for seamless communication across markets<br>• Software development assistance, such as GitHub Copilot, which can include optimization suggestions, debugging, test case creation, and language conversion | • Compliance, including compliance scanning, breach assessments, and compliance incident handling<br>• Fraud detection and anomaly identification | Plan sequences of actions, learn from outcomes, maintain context across interactions, and coordinate with other systems to deliver personalized solutions and recommendations. For example, performing root-cause-analysis on a system exception, where AI agent scans the code-base, suggests fixes, and updates code suggestions for developers to review and approve |

Source: Oliver Wyman analysis

SFF2024 showcased how organizations are enabling GenAI point solutions to increase productivity, efficiency, and effectiveness through third-party tools such as GitHub Copilot, as detailed in the following examples.

- **Shaun Khalfan, Senior Vice President and Chief Information Security Officer at PayPal**, shared how they have utilized Copilot to accelerate the product engineering and software development lifecycle, "We've leveraged [GenAI] internally to help accelerate code production to create product velocity for engineers. [We] ensure that they get rapid feedback if they're having [...] cross-site scripting, a[n] SQL injection, [or] vulnerabilities in their code [...]. [This] really help[s] to accelerate the engineering and product velocity so we can push products to market faster."[3]
- **Marsh McLennan** developed and rolled out GenAI tools within three months, identified more than 300 use cases within a month, and created more than 20 GenAI skills. More than 50% of Marsh McLennan's workforce now uses GenAI.

Starting with internal use cases promotes a "post-GenAI" mindset, enabling innovative use cases across various teams to flourish within a controlled environment.

Organizations are also unlocking value via transformative GenAI initiatives that streamline complex external-facing processes. These initiatives involve looking at the end-to-end workflow, such that AI can unlock fundamentally different ways of working and reinvent the customer experience. Experts at SFF2024 discussed examples of transformative initiatives in areas such as fraud detection.

> "GenAI can track transactions based on location, device, and operating system, flagging any anomaly or behavior that does not fit the expected patterns."[2]
>
> Ravi Menon, ex-Managing Director of MAS

- **In his keynote, Ravi Menon, ex-Managing Director of the Monetary Authority of Singapore (MAS), explained the underlying technology of GenAI in fraud detection**.
- **Matthew Driver, Executive Vice President and Head of Services APAC at Mastercard APAC**, shared that Mastercard has been working with AI for more than a decade and the organization today deploys AI to drive anomaly and fraud detection on all its 150 billion transactions.[4]
- **Akio Isowa, Senior Managing Executive Officer and Group Chief Digital Innovation Officer at Sumitomo Mitsui Banking Corporation (SMBC)**, shared that SMBC has deployed an internal chat application utilizing GenAI for tasks such as translation.[5]

> “Ant Group has adapted AI [beyond] the productivity increase [to offer] consumers new services. For example, China Alipay offers a wealth management agent that not [only] answers questions from consumers, [but] also guides consumers to make better decisions for insurance [...] and wealth products.”[6]
>
> Yang Peng, President of Ant International

Due to their complexity, transformative initiatives would need to be centrally funded and supported by cross-functional teams, including among others, technology, analytics, risk, user interface (UI)/user experience (UX), and AI specialists. Robust change management processes are critical to drive deep integration and sustainable outcomes, thereby ensuring adoption.

**SFF2024 discussions also featured AI agent solutions which optimize processes and enhance efficiency.** AI agents can autonomously execute complex workflows, adapt to user preferences, and provide context-sensitive responses to support human decision-making.

**Yang Peng, President of Ant International**, shared about the Group’s successful implementation of a capability that recommends wealth management services to customers.

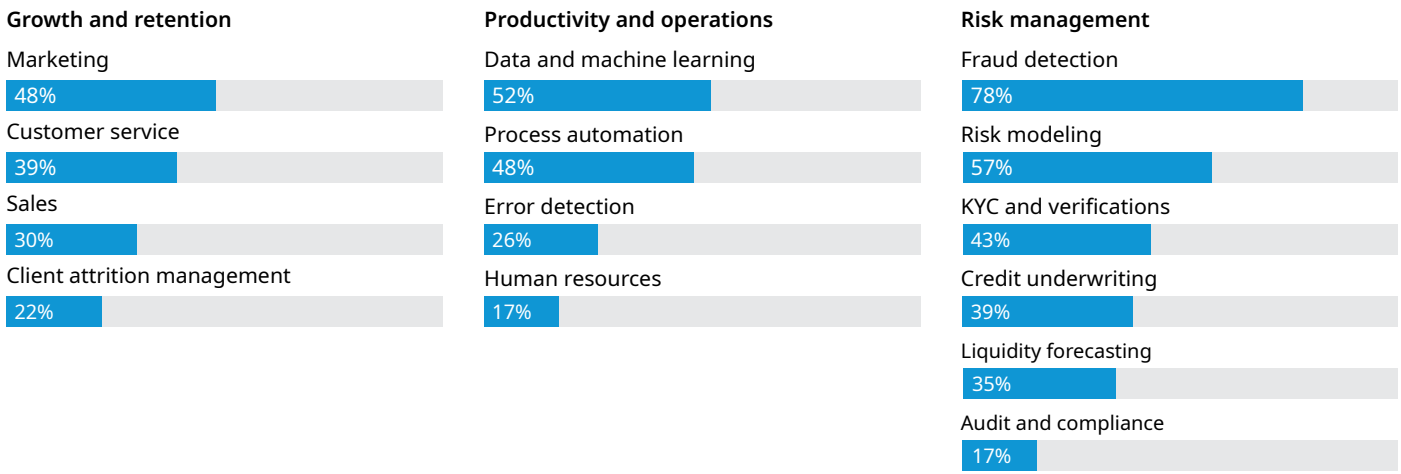
**Predictive AI has become a cornerstone of financial services, with various applications already in place. However, there is further untapped potential in advanced applications.**

According to an Oliver Wyman survey of 23 financial institutions in Asia Pacific in the lead up to SFF2024, the most common predictive AI use cases are within fraud detection and risk modeling.

**Shaun Khalfan, Senior Vice President and Chief Information Security Officer of PayPal**, shared a success story in fraud detection, “During the pandemic, we had significant growth from 710-plus billion transactions to 1.2 trillion transactions. Leveraging AI models, [we were] able to still cut fraud losses in half.” Some market applications for predictive AI have also been explored, such as interest rate prediction, as well as foreign exchange (FX) and currency needs forecasting.[7]

The Oliver Wyman survey also revealed that the level of maturity differs by organization, with various organizations deploying predictive AI to different extents.

**Exhibit 3: Oliver Wyman survey of financial institutions' GenAI strategy**
Where is predictive AI currently deployed in your institution?, N=23




Source: Oliver Wyman's Asia Pacific GenAI benchmarking survey, November 2024

Even within financial institutions that are more advanced in predictive AI adoption, most use cases remain in risk management and marketing. While these applications demonstrate predictive AI's value, its broader potential, particularly in advanced customer-facing applications such as hyper-personalization, remains largely untapped due to data quality, data complexity, and operating model challenges.

**Predictive AI models support hyper-personalization by analyzing historical customer data to predict products and services that could better meet customer preferences and needs.** The AI models can predict the demands of more granular customer segments, even down to the level of the individual customer. This allows organizations to experiment with customer personalization approaches, such as tailored purchase recommendations or by innovating new products, thereby unlocking higher revenue and enhancing customer experience and satisfaction.

Financial services customers are also increasingly demanding more personalized services and recommendations.

A 2023 survey by Salesforce of Financial Service Institution (FSI) customers worldwide found that 73% of customers expect companies to understand their unique needs and expectations, up from 66% in 2020.[8] The cost of not providing a personalized customer experience is steep, with more than half of customers saying they would switch FSIs if services felt impersonal.

**Despite having access to valuable transaction data, even the AI-advanced financial institutions today are underleveraging predictive AI for hyper-personalization compared to retail technology players.** Retail technology players such as Meta and Netflix have reached a level of maturity in applying AI to their respective high volumes of customer data for hyper-personalization, such as purchase predictions and recommendation systems. In comparison, financial institutions are primarily using transaction data in a patchy manner. While this is in part due to the fact that the financial services industry is more heavily regulated, and therefore has a more risk-focused culture compared to retail technology, there is still room to expand customer-facing use cases within the industry. Oliver Wyman's survey of financial institutions revealed that there are many other underutilized customer-facing applications, such as sales, pricing, and customer retention.

**Anette Bronder, Chief Technology and Operations Officer at Prudential plc**, agreed that personalization is the next goal for financial institutions, "We have implemented [AI in] our call and service center and talkbots. Now, we are focusing more on an end-to-end perspective, [... such as] how to capture data at the front end. In the future, we want to go for the highest level of automation and personalized customer services and products."[9]

**Despite its vast potential, predictive AI remains underutilized due to a combination of data quality and complexity challenges, as well as operating model limitations.**

Firstly, many organizations face challenges in accessing quality data and handling complex data-related processes. The lack of access to quality data undermines the robustness and output accuracy of AI models. In addition, handling the sheer volume of consumer data involves complex processes which can overwhelm existing systems, leading to inefficiencies in generating actionable insights. Fragmented data sources can also further hinder effective analysis.

"AI without the data foundation is like a Ferrari without a road [..]," elaborates **Anette Bronder, Chief Technology and Operations Officer at Prudential plc**, on the importance of data for AI adoption. "Data is key for us — this means breaking down data silos, building data repositories, [providing] seamless access to data, and [ensuring] the right data quality."[10]

Secondly, to overcome data-related challenges and successfully adopt advanced predictive AI use cases, agile cross-functional collaboration between business, operations, technology, risk, and data teams is necessary. However, many organizations are limited by traditional organizational silos and rigid frameworks. To prioritize AI opportunities and to streamline complex processes in digital design, data handling (including data collection, storage, integration, and processing), and change management, an agile and collaborative operating model is critical. A combination of cross-functional governance and team setup is key for resolving business, data, analytical complexity, and control challenges, as business units, including front end, operations, technology, data, and risk, must align on the outcomes of effective predictive AI. This point is further discussed in the next section.

**AI technologies, including machine learning, GenAI, and predictive AI, should not be discussed in isolation. Instead, they represent a broader capability that, when integrated, unlock transformative possibilities by leveraging complementary strengths.** Both GenAI and predictive AI models rely on quality input data to understand context and patterns, respectively. Through sophisticated machine learning techniques, these systems process and analyze data, while continuously refining their models to enhance accuracy.

As an example, leading financial services organizations are leveraging this combination in the way compliance incidents and breaches are identified and prioritized for further compliance assessments using traditional machine learning techniques. The processes are further complemented using GenAI to auto-draft compliance assessments for humans to review. This end-to-end transformation of the compliance workflow can enhance the efficiency and effectiveness of compliance teams by dramatically reducing manual effort, recommending further data for evaluation, and suggesting potential next steps in the review process.

## B. THE AI OPERATING MODEL

Technical implementation alone is insufficient to unlock the full potential of AI. To fully realize the power of AI, organizations must concentrate on enhancing all four key areas of the AI operating model: Governance, risk management, technology implementation, and organizational readiness. This ensures a structured approach to adopting AI while addressing risks, fostering innovation, and scaling capabilities.

**Exhibit 4: AI operating model**

**Governance**

Governance establishes the **framework for decision-making and accountability** in AI initiatives, ensuring that policies, procedures, and ethical standards are upheld. It provides the necessary oversight to align AI strategies with business objectives and regulatory requirements.

**Risk management**

Risk management focuses on **identifying, assessing, and mitigating risks** associated with AI. **Minimum guardrails** are required for safe experimentation, such as controls for hallucination. It ensures that AI applications are deployed responsibly and potential negative impacts on consumers and the organization are minimized.

**Technical implementation and management**

This component encompasses the infrastructure, tools, and processes required for the effective development, deployment, and maintenance of AI systems. It emphasizes the importance of building a reliable and scalable technology that supports AI initiatives while managing costs.

| | |
|---|---|
| AI technology and modeling | Data management |
| AI performance monitoring | AI vendor management |

**Organizational readiness**

Organizational readiness involves preparing the workforce and culture to embrace AI technologies through training, upskilling, and fostering a data-driven mindset. This component ensures that employees are equipped to leverage AI tools effectively and that the organization can adapt to the evolving landscape of AI applications.

| | |
|---|---|
| Education | Data culture |

Source: Oliver Wyman analysis

**Effective governance is a foundational element for facilitating the adoption and integration of AI** within an organization. It provides a structured framework of policies, guidelines, and accountability mechanisms to align AI initiatives with organizational goals, maximizing business value while minimizing risks. A value-focused governance approach will ensure that the business is involved in AI initiatives, that AI initiatives are prioritized based on their value creation potential while balancing risks, and that proper change management processes are put in place during the rollout of AI tools.

In the early stages of AI adoption, organizations are generally well-served by a centralized approach, such as establishing a Center of Excellence (CoE). This model facilitates a value-focused and risk-conscious integration of AI by consolidating capabilities across the organization and laying a solid foundation for early AI initiatives. Within this framework, the CoE is responsible for prioritizing use cases and overseeing the development and deployment of AI applications.

As organizations mature on their AI journey, they evolve into a hub-and-spoke model, that better accommodates scale and business demands. Within this model, individual business functions gain autonomy in prioritizing and developing business-specific use cases. This evolution creates greater agility and responsiveness to specific functional needs while preserving oversight at a central level for strategic alignment around organizational goals and objectives.

This progressive approach to governance demonstrates how organizations can maintain essential control and accountability while adapting their operating models to support growing AI maturity and complexity. The key lies in finding the right balance between centralized guidance and decentralized execution, allowing for both strategic consistency and operational flexibility.

**Risk management refers to the systemic identification, assessment, and mitigation of risks** associated with the development and deployment of AI. This critical function helps protect both organizations and customers from potential negative outcomes, such as biased decision-making, faulty algorithm results, and data breaches, while ensuring that the use of AI aligns with ethical standards.

In response to evolving regulatory requirements, organizations are implementing AI risk management practices by establishing comprehensive frameworks that align with applicable laws and guidelines. As regulations become increasingly clear and specific, particularly for high-risk AI applications, organizations are being mandated to incorporate essential safeguards, such as bias mitigation strategies and testing protocols, into their AI systems to ensure compliance and customer protection.

To uplift AI risk management, organizations should implement a series of proactive measures targeting risks across the AI lifecycle.

Organizations should also adopt appropriate **risk mitigation strategies** based on the severity and likelihood of risks. They should also monitor for unintended consequences and adjust strategies as needed.

**Regular testing of AI models and systems** is also crucial for evaluating performance before and after deployment. Feedback loops should be established between developers and deployers to facilitate continuous improvement.

> “[Just like] you have the model committee, everything you’re doing with AI is going to [undergo] the same rigor. [...] [When] you start understanding the security stack, [you can] plug and fit [into] the organization’s risk models and concepts of risk.”[11]
>
> Kfir Godrich, Chief Innovation Officer, Blackrock

In addition, AI systems should be designed to allow for **human oversight and intervention**. Organizations must ensure that responsible individuals can access and interpret AI outputs, as well as utilize monitoring tools to track performance and detect unexpected behaviors in AI systems. Criteria should also be established for when and how human intervention should occur. Finally, to systemize regular monitoring, organizations should create logs of oversight activities.

Leading organizations have implemented several notable safeguards. One example from Blackrock is the expansion of current model risk management processes to also assess AI models.

In another example, for Project GenGuardX (GGX), Oliver Wyman and Corridor Platforms teamed up to create a solution to test for, measure, and monitor novel risks presented by GenAI in financial services. The platform provides a highly controlled environment for the development, governance, and monitoring of LLM applications, supported by an extensive framework and methodologies for evaluating performance and risks of LLMs and LLM applications. This empowers banks to develop and operationalize LLM applications quickly and safely.

**Technical implementation and management** play a vital role in the effective use of AI within an organization, as they encompass the infrastructure and tools necessary for the development, deployment, and maintenance of AI systems. Organizations must prioritize three key success factors in their infrastructure design: 'Data accessibility and quality', 'system reliability and security', and 'infrastructure flexibility and scalability.'

**Firstly, easy access to quality data is crucial for AI technical implementation and management because it enables the training and fine-tuning of machine learning models, allowing them to learn patterns and make accurate predictions.** High-quality, diverse datasets are essential for developing robust AI systems that can generalize well to new, unseen data. Additionally, continuous access to data allows for ongoing model evaluation and improvement, ensuring that AI systems remain effective and relevant in a rapidly changing environment. Thus, data accessibility ensures that the promised value of AI solutions is delivered continually.

**Secondly, a reliable and secure AI system ensures that sensitive information is adequately protected against unauthorized access and cyber threats.** It is critical for effective data control and robust cybersecurity management. Organizations face the choice of hosting their AI models either on-premise or remotely, with each option presenting its own advantages and challenges.

For instance, while hosting systems on-premise may provide greater control over data and security, it is often inaccessible and costly due to the need for large storage capacity and infrastructure maintenance resources.

In contrast, using a remote cloud hosted by a third-party introduces additional risks, as organizations have limited visibility and control over data protection and storage, and have to rely on the vendor's control mechanisms. To address these challenges, organizations can adopt strategies such as private clouds or multi-cloud environments to ensure that their infrastructure meets stringent internal and regulatory requirements surrounding data security and privacy.

In financial services, private clouds are particularly sought after due to their ability to provide enhanced security and control over sensitive data. Private cloud security measures include firewall configurations, virtual private networks, data encryption, authorization mechanisms, and more.[12]

In addition, large organizations are increasingly adopting multi-cloud strategies to enhance their operational agility and resilience. By utilizing multiple cloud service providers, these organizations can improve data redundancy and disaster recovery capabilities. This approach also enables them to meet diverse regulatory and compliance requirements across different regions, ensuring that their data management practices align with local laws, and specific use cases are served well for their sensitivity requirements.

**Dowson Tong, Executive VP of Tencent**, elaborated on the need for private cloud and multi-cloud strategies, "Not only [do] we support [a] multi-cloud [strategy], we also support private cloud deployment because [...] for compliance reasons, some of the financial institutions might choose to [...] maintain their own data centers for some part of the applications. [...] Resilience is definitely a very important aspect of using cloud. But by purely using a public cloud doesn't guarantee resilience [...] After a few incidents, we realized that data centers could catch fire, the network can get cut off. We need to have better design of the overall application architecture — in many cases, [this means having architecture] across different availability zones, sitting in different cities, to make sure if any disaster happened to [one] data center, you can still provide services for your most mission critical services."[13]

> "Many of the technologies that we have been using in China, as well as our global services, have been very efficient. We [...] build our infrastructure with a commercialized version of standardized open-source software, and we scale it based on commoditized hardware architecture. That has brought down a lot of the cost of running financial services."[14]
>
> Dowson Tong,
> Executive VP of Tencent

**The third success factor is ensuring the supporting infrastructure is flexible and scalable to meet increasing demand while optimizing for costs.**

In the face of expanding AI use cases, implementing a **modular architecture** allows organizations to make incremental upgrades and integrate new technologies without necessitating a complete system overhaul. This approach also applies to building modular foundational AI capabilities, which can then be re-used across other use cases. This will ensure organizations avoid unnecessary expenses and duplicative efforts while adapting to changing business needs.

Adopting **cloud-native technologies** can unlock long-term cost efficiencies by reducing reliance on legacy systems. Cost management can be further enhanced by utilizing standardized **open-source software**. Open-source software, developed and distributed under licenses that allow for modification and redistribution, enables organizations to customize solutions to fit their specific needs while avoiding high licensing fees associated with proprietary software. This lowers overall costs related to software acquisition and maintenance.

In addition, organizations can consider leveraging **commoditized hardware**, which are cost-effective components that are mass-produced and sold at relatively lower prices. Examples include standard servers, storage devices, and networking equipment that do not have unique features or proprietary technology.

> “[In] insurance, I think one of our biggest challenges right now is build[ing] up a data mindset and a data culture. [...] To bring analytics to scale, [...] we need to build up this data mindset by enabl[ing], upskill[ing], and reskill[ing] all people to create this understanding [that] data is important.”[16]
>
> Anette Bronder, Chief Technology and Operations Officer at Prudential plc

**Organizational readiness** refers to the preparedness of the workforce and culture to adopt and integrate AI. This readiness is a crucial make or break point that defines the success of AI across the organization, which depends on equipping employees with the necessary skills while promoting a culture that embraces innovation.

SFF2024 highlighted people, talent, and mindset related challenges as a stumbling block for AI adoption.

**The skills gap is a critical issue.** About 79% of the financial institutions surveyed by Oliver Wyman identified the skills gap as the key people-related challenge in adopting GenAI. Many organizations lack professionals who are proficient in data science, machine learning, and AI-related fields, making it difficult to harness the full potential of these technologies.

To build an AI-ready workforce, organizations must prioritize comprehensive **training and upskilling** initiatives that enhance their employees’ understanding of AI concepts, tools, and applications. Such training not only empowers staff to utilize AI-driven solutions but also helps demystify the technology, fostering a culture of innovation and adaptability. On the flipside, **insufficient training and development initiatives** can lead to employees feeling overwhelmed or uncertain about how to integrate AI into their workflows, leading to resistance to change and a lack of engagement in AI initiatives.

**Tal Cohen, President of Nasdaq**, talked about about Nasdaq’s investment in employee upskilling, “We are focused on upskilling our employees. We’ve put an AI platform out there to help our employees upskill themselves and take this journey with us, because we can’t go on this journey without our employees. If you take care of your employees, they’ll take care of your customers.”[15]

The next step after upskilling is **cultivating a strong organization-wide data culture** by encouraging cross-functional collaboration, which allows teams to share insights and best practices related to AI implementation. By promoting an environment where AI is embraced and integrated into various functions, organizations can drive efficiency across the entire organization.

Relatedly, responsible AI deployment also includes considering its social implications. Experts at SFF2024 discussed the potential replacement of employees' jobs by AI, and agreed that AI will not cause job loss, but will instead automate less value-adding tasks, providing assistance along the way, freeing up human capacity to be upskilled for high value, customer-facing tasks.

The takeaway of the discussion was summarized by moderator **Hongbin Jeong, Producer and Presenter at MONEYFM**, "Even if we are using AI, we still need that human touch, especially when it comes to dealing with customers and that customer experience."[17]

While the SFF2024 discussion quells the fears of short to medium-term risk of job loss, organizations should remain conscious of longer-term social risks, such as polarization, and put in place measures to ensure equitable and accessible upskilling to prevent the marginalization of lower-skilled workers. Ultimately, organizations should invest in training that not only develops technical skills but also emphasizes ethical and social considerations, ensuring that employees are equipped to navigate the complexities of AI responsibly.

## C. LESSONS FROM THE ADOPTION OF AI

The potential of AI cannot be considered in isolation; it is crucial to also address the challenges arising from its rapid development and implementation. Many organizations have kickstarted their AI adoption journeys. This section presents the key lessons learned from early adopters and offers actionable insights for future success.

**Lesson 1: Organizations must invest in all components of the AI operating model for effective AI adoption**

Coordinated progress across all four components of the AI operating model is key for ensuring overall success, rather than making focused investments in siloed areas. When implementing AI solutions, many institutions often prioritize technology implementation as it is the most apparent enabler of AI initiatives. However, it is essential not to overlook other critical components, such as the AI governance model, AI risk management, and the development of an AI-ready workforce, as these are vital for achieving sustainable long-term results from AI initiatives. This holistic approach not only enhances the effectiveness of AI initiatives but also mitigates risks and ensures that organizations can harness the full potential of AI in a responsible and sustainable manner.

**Lesson 2: There are significant overlaps between model governance, data governance, and relatively new AI governance. Organizations need to understand the specific roles and responsibilities of these three teams upfront, and ensure they work well together**

Most risk functions in financial institutions today already have robust models and data governance frameworks in place to support technology and data-related operations. Model governance focuses on the validation, as well as compliance and performance monitoring, of all technology models, including data and AI models. Complementarily,

data governance ensures that the data used for training and operating these models is of high quality and adherent to regulations.

When organizations adopt AI solutions, AI governance is also introduced to establish an overarching framework for ethical and responsible AI use. Close collaboration between these teams is necessary, as the former two risk classes have enhanced risks because of AI and must factor in the requirements for necessary controls specific to AI management. Therefore, the specific roles of each risk governance function need to be clarified early on to ensure synergies and efficiencies are leveraged.

**Matthew Driver, Executive Vice President and Head of Services APAC at Mastercard APAC**, describes the importance of considering all three risk aspects when implementing AI tools, "We run an internal enterprise risk panel, in which anybody who wants to run any kind of AI application has to make a submission to this group, and they will determine what the model is going to be focused on achieving, what data they are using, and what permissions they have for that data. It is only [when] that risk committee is satisfied that they are considering all those factors, then they'll go into beta build, run the test, [observe] the outcomes, and roll into production."[18]

Jointly, these three governance sub-functions ensure that compliance and security concerns are considered upfront, and that there is appropriate oversight for every AI solution that is developed and deployed.

Aside from the risk function, participation from the business and technology functions is also key for the success of this integrated governance model. Business units provide insights into customer needs and market trends, while technology teams ensure technical feasibility, making sure that the necessary infrastructure and tools are in place for successful AI implementation.

### Lesson 3: Lack of customer trust can derail expected benefits. Prior to launching AI-enabled products and services, organizations should build customer trust upfront by setting up fundamental controls, especially in the areas of model bias and transparency

The significance of customer trust is underscored **by Tal Cohen, President of Nasdaq**, who states, "A word that I think is very important when we talk about cyber is trust. Every company is going to face this situation, every company is going to face an incident. How you respond to that incident is going to determine how your customers or your regulators trust you to handle that."[19]

Beyond this specific context of incident management, customer trust holds critical importance on a broader scale as well. Globally, consumer attitudes towards AI have become more negative — comfort using AI has lowered by 11% between 2024 and 2025, and only 26% of consumers trust organizations to use AI responsibly.[20] This makes the establishment of trust essential for successful AI adoption. Customer concerns can stem from several areas, such as customers worrying about how their data is used, and the possibility of errors or biases in AI systems. Additionally, there is apprehension about the lack of transparency in AI decision-making processes, which can lead to uncertainty regarding how decisions are made and whether they are fair and unbiased. These sentiments were echoed in the SFF2024 discussions too. Overcoming these concerns is key for ensuring the safe and trustworthy use of AI.

**To nurture customer trust in an organization's AI adoption, fundamental safety controls should be set up to manage model bias and ensure overall transparency.**

- **Internally, bias-related controls are necessary to manage the risks of misleading information that arise from the inaccuracies and biases of AI models.** Many organizations lack access to quality training data, resulting in skewed predictions by AI models, which learn and replicate the issues in the underlying dataset, such as errors, imbalances, and societal biases. In the presence of insufficient or ambiguous input data, AI hallucination occurs where these models fabricate incorrect or nonsensical outputs that seem plausible but are not grounded in reality.

  **Jonathan Larsen, Chief Innovation Officer of Ping An Group**, explained the risks of such inaccuracies, "If you have a customer facing a chatbot and it's something important, like financial services or health, you can't run the risk of the model making stuff up [and] tell[ing] people to do things that are completely inappropriate and would be either costly or harmful to them. That's clearly a major problem."[21]

  The ability of financial institutions to train and fine-tune AI models to mitigate the risks of model bias is a crucial success factor for effective and trustworthy adoption.

- **By promoting transparency of the underlying datasets and methods used in AI models, organizations can facilitate accountability and enhance customer confidence.** To build customer trust and ensure customers can make informed decisions about their engagement with AI, they should be informed about what data is being collected, how it will be used for AI applications, and the measures in place to protect their privacy. Transparent data collection and disclosure of AI use mitigate fears related to surveillance and the misuse of personal information, thereby encouraging broader acceptance towards the use of AI. Additionally, model transparency is crucial to build trust in safe AI adoption, because it allows users to understand how underlying methods and algorithms drive the decisions and predictions made by AI systems. When the workings of an AI model are clear, users can assess its reliability, fairness, and potential biases. Users can also scrutinize the algorithms and data that drive AI outcomes, facilitating accountability and ethical considerations in the use of AI.

> "How do we minimize the black box syndrome that you see in many AI models? The massive amount of data, the complexity of the algorithms, and the dynamic nature of AI systems make their results difficult to interpret and explain."[22]
>
> Ravi Menon, ex-Managing Director of MAS

It is evident that promoting bias-controlled and transparent AI usage requires the close management of data, model, and AI risks. This underscores the importance of an integrated governance framework as detailed in Lesson 2.

### Lesson 4: The value of AI is only unlocked from user adoption; to ensure successful traction, AI tools should be built for the end-user in mind by adhering to "user-first" and "customer-first" principles throughout the development lifecycle

A "customer-first" mindset entails thinking deeply about the customer problem and embedding AI into the customer workflow in ways that make a meaningful difference in the way customers interact with products and services. Financial institutions should prioritize the needs of end-users and customers throughout the journey of designing and adopting AI solutions. To deliver an AI solution that unlocks real value, it is essential to engage end-users meaningfully at every stage of the process. This includes gathering user requirements, shortlisting pilot use cases, co-developing the pilot with users, conducting user testing, and implementing the post-deployment change management process.

**Exhibit 5: A "user-first" approach to AI adoption**

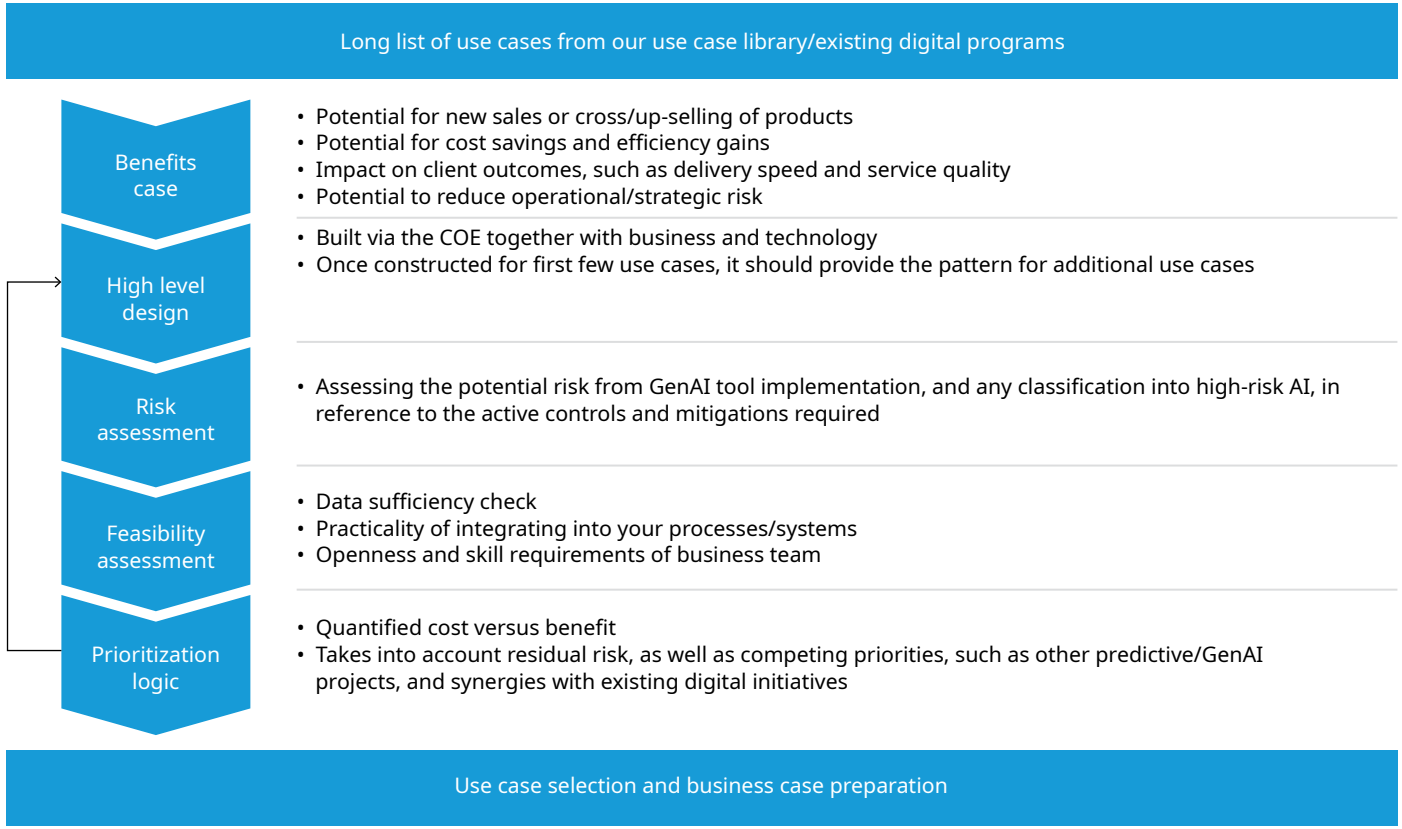
| | What a "user-first" approach looks like |
|---|---|
| **Stage 1**<br>Gather user requirements | • Gather user requirements via interviews, surveys, and focus groups to build a deep understanding of specific pain points |
| **Stage 2**<br>Propose and shortlist AI pilot projects | • Collaborate with users to evaluate potential AI projects based on their relevance and impact<br>• Prioritize the right pilot projects which directly address the identified user requirements |
| **Stage 3**<br>Co-develop pilot project with users | • Set a vision and align cross-function teams on the purposes of the product, including how it serves the end user<br>• Adopt a co-development approach and engage users frequently to gather ideas and feedback |
| **Stage 4**<br>Pre-deployment user testing | • Conduct thorough user testing to validate the product's functionality and usability<br>• Gather and incorporate user feedback to refine the solution before full deployment |
| **Stage 5**<br>Post-deployment change management | • Implement comprehensive training programs that equip users with the knowledge and skills to effectively utilize the solution<br>• Communicate with users consistently regarding updates, new features, and best practices<br>• Track user feedback continuously post-launch to identify areas for ongoing improvement<br>• Introduce incentives to encourage user engagement and feedback |

Source: Oliver Wyman analysis

**Lesson 5: Despite the new wave of excitement over AI, institutions should evaluate its value and take caution against building AI for the sake of it**

With the increasing conversations and excitement surrounding the potential of AI, many institutions are looking to double down on AI adoption. However, it is crucial to recognize that the promised productivity uplift from AI adoption will only manifest in specific roles and use cases, rather than universally across all functions. Organizations should prioritize simple use cases that deliver the most value for them, assessing each potential use case based on the cost-benefit ratio, risks, and feasibility.

**Exhibit 6: AI use case prioritization logic**




Source: Oliver Wyman analysis

In the immediate term, the focus should be on building conviction and know-how among users, starting with a few straightforward use cases involving a small group of power users to generate excitement and buy-in.

For long-term success, institutions must aim for widespread activation throughout the organization, implementing immersive and customized training programs akin to digital rollouts. This approach will help develop internal capabilities and help prepare for a post-GenAI mindset, enabling the exploration of hundreds of use cases that can drive meaningful change and innovation.

## D. EVOLUTION AND THE ROLE OF PUBLIC-PRIVATE PARTNERSHIPS

The global AI regulatory landscape is evolving rapidly, with the pace having accelerated after the introduction of GenAI. Governments, regulatory bodies, and international organizations are working to establish frameworks aiming to balance innovation with ethical considerations. Public-private partnerships (PPPs) are emerging as a critical mechanism to accelerate AI adoption while addressing challenges such as data accessibility, infrastructure development, and risk management.

## Exhibit 7: Global AI public policies and regulations

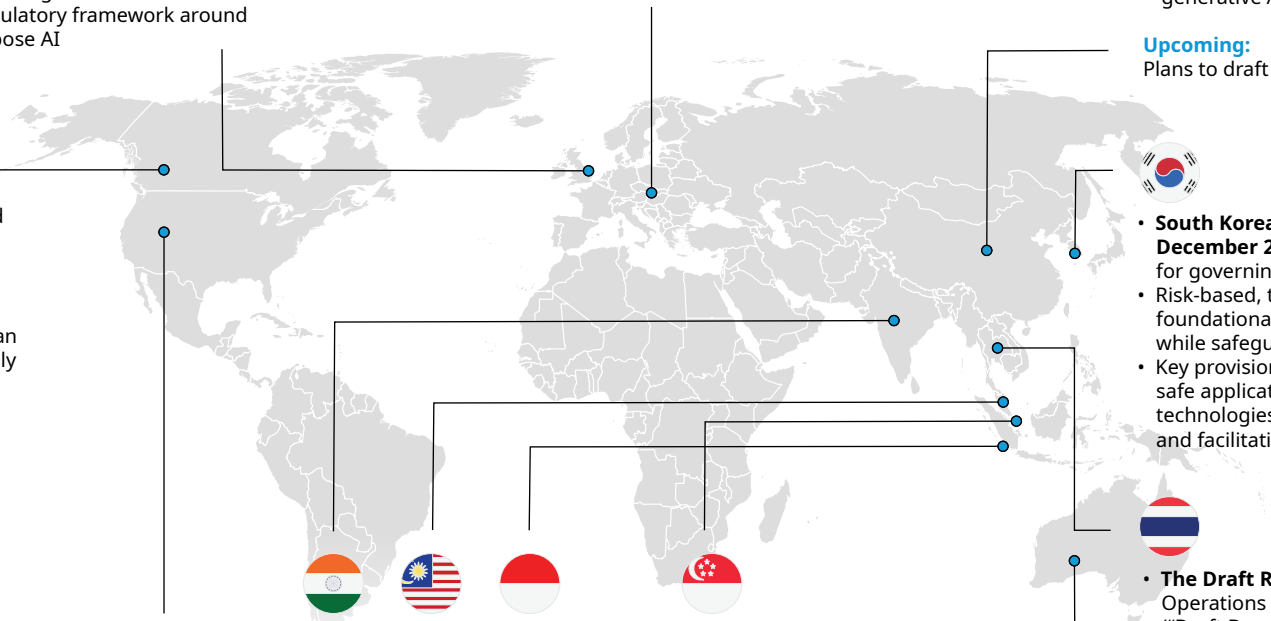
- **UK draft framework for AI regulation** — a cross-sector and outcome-based framework, regulating AI across five core principles
- Balances innovation and safety

**Upcoming:**
- 2025: Key regulators to publish more details and guidance
- Anticipated need for targeted legislative interventions to address gaps in current regulatory framework around risks posed by general purpose AI

- **EU AI Act (passed March 2024)** — harmonizes rules for the use of AI systems in the EU
- Extraterritorial nature of the Act has **implications on organizations conducting business within the EU and with EU citizens**
- Definition of AI is extended to include all computational modeling
- Sets out AI governance requirements based on four risk severity categories
- Provisions related to predictive AI systems apply after six months and GenAI after 12 months

- Proactively **fostering domestic AI capabilities** while imposing **robust regulations and technical standards** to contain perceived risks in key areas
- List of areas which AI products and companies should avoid
- Trial Ethics Regulation (2023)
- Interim administrative measures for generative AI services (2024)

**Upcoming:**
Plans to draft comprehensive AI law



- **AI and Data Act (AIDA)** — first step towards a new regulatory system designed to encourage responsible adoption of AI
- Will work with the EU, UK, and US to align approaches to ensure Canadian firms can be recognized internationally

- **South Korea's AI Basic Act (passed December 2024)** — unified legal framework for governing AI in South Korea
- Risk-based, tiered approach to establish foundational regulations for AI systems, while safeguarding innovation
- Key provisions include: The development and safe application of AI; standardization of AI technologies; support for SMEs in AI adoption; and facilitation of international cooperation

- **Biden's executive order on AI (2023)** mobilizes federal government to create policies and guidelines on the application and advancement of AI
- **Blueprint for AI Bill of Rights (2024)** with guidelines for the responsible design and use of AI
- **Future of AI Innovation Act (2024)** to develop standards and best practices while safeguarding risks

**Latest developments (January 2025):**
- **Revocation of the Biden AI Executive Order**
- Announcement of about **US$500 billion private sector AI infrastructure investment**

**2024:**
**Draft AI regulation frameworks**

- **MAS FEAT principles/Veritas** for responsible AI usage (2018/2022)
- **Singapore <> US interoperable AI Governance frameworks** (2023)
- **PDPC Model AI Governance Framework** (2019, 2020)
- **IMDA Proposed Model AI Governance Framework for Generative AI** (2024)
- MAS recently published a **whitepaper for Financial Sector Generative AI Risk Framework** (2024)

- **The Draft Royal Decree** on Business Operations that use AI Systems ("Draft Decree")
- **The Draft Act** on the Promotion and Support of AI Innovations in Thailand ("Draft Act")

- Australian **Voluntary AI safety standard** released with 10 guardrails outlining AI best practice
- **Australian mandatory guardrails likely to be legislated in 2025**

Source: Oliver Wyman analysis

**SFF2024 gathered perspectives on the evolving role of public policy and its implications on AI innovation, particularly in the financial services sector.**

- **Public policy governing the use of AI in financial services has been shaped by an evolving combination of technological advancements, regulatory needs, and societal concerns.** In the beginning stages of AI integration into financial services, public policy was largely reactive. Regulators acknowledged AI's potential but harbored concerns about its risks, leading to initial frameworks that focused on compliance with existing financial regulations while promoting innovation within those limits. As AI technology advanced and the use of AI became more prevalent, there was growing concern on issues such as data privacy, accountability, and the transparency of decision-making processes. In response, regulatory bodies began to emphasize the importance of targeted AI risk management frameworks.
- **Starting from the EU as one of the first movers with the EU AI Act, other countries and regions worldwide are gradually developing their own AI guidance today.** Proposed in 2021 and adopted in 2024, the EU AI Act is the world's first comprehensive regulation on AI by a major regulator. The act categorizes AI systems by risk, with most regulations specifically targeting providers of high-risk AI systems. This includes systems that facilitate access to essential private services, such as financial services like insurance and credit.[23] Regulators around the world have also issued non-legally binding guidelines that urge organizations to pay attention to critical risks associated with AI deployment in the financial services sector.
- One such example is from 2017, when the Financial Stability Board (FSB) published a report on '*Artificial Intelligence and Machine Learning in Financial Services*', outlining the implications of AI and machine learning on financial stability, as well as providing recommendations for monitoring risks.[24] Another example is from 2022, when the Bank of England (BoE) and UK Financial Conduct Authority published a report after an Artificial Intelligence Public-Private Forum, providing recommendations for firms on mitigating risks associated with the use of AI in financial services, and clarifying how the current regulatory framework applies to AI.[25]
- **As AI technology transcends national borders, there is also a growing push for international cooperation on AI regulations.** International organizations such as the G20 have initiated discussions on developing common standards and frameworks for AI governance. It is evident that in the coming years, AI risk and governance will remain a priority concern for regulators worldwide, and financial institutions should ready themselves for increased regulatory pressures surrounding AI deployment.

**Experts at SFF2024 agreed that balancing innovation and risk management is necessary to effectively accelerate AI adoption, especially during the current early stages of AI experimentation and development.**

- **Innovation is essential not only for the development of groundbreaking AI technologies, but also for ensuring that these advancements can be integrated into society effectively.** Regulators play a critical role in safeguarding innovation; while regulations are critical to manage AI risks, they should serve as a catalyst to accelerate safe and sustainable AI adoption, rather than as an inhibitor that stifles technological advancement. By enabling an environment that encourages experimentation, regulators can help expedite the transition to a future where AI technologies are deployed at scale. Therefore, regulators should strike an appropriate balance between protecting freedom for exploration and managing core risks via regulations.

  **K. Rajaraman, Chairperson of the International Financial Services Center Authority (IFSCA)**, cautioned against enforcing prescriptive AI-specific regulations, "At this point [in] time, AI's scope and applications are just evolving. Regulations without a proper understanding of what this technology can do or cannot do would certainly be inappropriate [and] may stand in the way of technology developing [or] coming out with use cases which can benefit the world at large. I think it's the early days and regulating anything without an understanding may not be the right way to go forward."[26]

- **Working within existing regulations could be a good start for regulatory bodies, while they work in parallel to understand the rapidly changing AI landscape.** Participants at SFF2024 noted that certain nations, including India and the UK, believe that existing laws are adequate for now and see no immediate necessity to implement new AI-specific regulations.

  **K. Rajaraman, Chairperson of the IFSCA**, explained the chosen approach of the Indian Government, "The current policy of the Government of India has been to let the industry be responsible for what they do, following the normal constitutional law in terms of non-discrimination, ensuring that there's no bias, ensuring privacy is honored, ensuring transparency, and so on. We would rather be guided by those principles than going for prescriptive regulations."

  **Sarah Pritchard, Executive Director for Markets and International at the United Kingdom Financial Conduct Authority (FCA)**, outlined the UK's similar approach to safeguard innovation, "Our starting proposition in the UK is that our existing rule set ought to be sufficient without a specific new rule set for AI."[27]

- **International organizations have also developed AI-specific guiding principles and ethical standards for policymakers and AI actors.** For example, in 2019, the Organization for Economic Cooperation and Development (OECD) published the OECD AI Principles as the first intergovernmental standard on AI, promoting five values-based principles that provide practical and flexible guidance for policymakers and AI actors. These principles are inclusion, human rights and democratic values, transparency, security, and accountability.[28] Guiding principles offer a more adaptable and innovative approach compared to prescriptive regulations, making them a valuable tool while regulators and organizations navigate the complexities of AI governance.

**SFF2024 discussants also highlighted the important role of public-private partnerships in accelerating safe and innovative AI adoption.** Collaborations between private organizations and government regulators can lead to a better understanding of AI technology, achieving optimal outcomes in promoting innovation and ensuring safe AI usage. Some examples of governments across the world playing an active role in public-private partnerships are detailed below.

- In Singapore, the government actively boosts AI adoption in financial services through robust funding and targeted education initiatives. In July 2024, MAS committed an additional S$100 million under the Financial Sector Technology and Innovation Grant Scheme (FSTI 3.0) to support financial institutions in building capabilities in AI and quantum technology.[29] To increase the supply of AI talent and build deep AI capabilities in the financial sector, MAS also launched the Financial Sector Artificial Intelligence and Data Analytics (AIDA) Talent Development Program in 2023. An AIDA Talent Consortium, comprising members such as MAS, DBS, UOB, the National University of Singapore, Nanyang Technological University, and Visa, was set up to encourage collaboration between key financial institutions and training institutes.[30] As part of this program, MAS first aggregates financial institutions' talent demands across various AIDA roles. Then, MAS works with the Institute of Banking and Finance, Institutes of Higher Learning (IHLs), and training providers to co-curate training programs that incorporate the latest developments and trends in AIDA.[31]

  The importance of education was emphasized by **Arnaud Caudoux, Deputy CEO of Bpifrance**, "Education is absolutely key. A lot of jobs are going to change [and] you need to prepare the population for that. If you want to have AI-ready engineers, you also need to have [the] right educational system."[32]

  In Indonesia, the government funded the development of digital public infrastructure, establishing a strong foundation of data accessibility crucial for AI adoption.

  **Vincent Iswara, the Chief Executive Officer of DANA**, shared about the government initiative, Indonesia Personal Access (INA) Pass, which integrates every citizen's digital identity to make it easier for them to access government services[33], describing its success, "In the last three years, almost half of all SMEs [have] onboarded to this digital platform. Out of 67 million SMEs, 35 million [are] already in this digital ecosystem because of this service."[34]

The success of Indonesia's INA Pass initiative underscores the importance of critical digital infrastructure for emerging markets to successfully adopt AI. By ensuring quality data availability and promoting data sharing, governments can create an environment conducive to technological and AI innovation.

- Various governments across the world have also established AI regulatory sandboxes to promote safe experimentation, including the UK, Brazil, Norway, Spain, and Singapore.[35, 36, 37, 38, 39] Well-structured AI sandboxes can assist governments with developing flexible AI regulations that enhance economic growth and productivity. They enable organizations to test AI-enabled products in a controlled environment under regulatory oversight. Organizations benefit from access to incentives such as waivers, expedited registration, and compliance guidance. Regulators also gain a better understanding of AI technology and how it interacts with regulatory frameworks. Thus, AI regulatory sandboxes enable governments and regulators to gain valuable insights on AI and inform policy updates that foster innovation while mitigating risks.

  Echoing the critical role of government action in supporting AI experimentation, **Arnaud Caudoux, Deputy CEO of Bpifrance**, noted that governments can also provide access to sensitive data to aid the development of large-scale AI use cases, "There [are] a lot of data sets with governments in healthcare [and] security. There [are] a lot of use cases you can build on that, and they fully depend on governments. Governments should provide the playground for AI actors to work on this kind of data."[40]

## E. THE POTENTIAL OF QUANTUM TECHNOLOGY

**Quantum computing is in its nascent stage, with leading organizations exploring ways to unlock its potential effectively.**

- **The concept of quantum computing is based on quantum mechanics.** Unlike classical computers, which are grounded in classical physics and use binary bits, represented as either zero or one, as their basic unit of information, quantum computers utilize quantum bits, or qubits. Qubits operate under the principles of quantum mechanics, allowing them to exist in a state of both zero and one simultaneously.

  **Dr Marco Pistoia, Head of Global Technology Applied Research at JPMorgan Chase**, highlighted, "The fact that you can entangle different qubits and make them corelate with each other creates a network of possibilities that allows quantum computers to have exponentially-growing computational power."[41]

  **Quantum computing is a relatively recent concept; ongoing research is focusing on its potential to enhance computational speed and tackle complex problem-solving tasks beyond the reach of classical computers.** While quantum computing was first theorized in the 1980s, one of the first viable real-world applications for a quantum machine only took place in the 1990s. In 1994, the groundbreaking Shor's algorithm demonstrated the potential of quantum computers to factor large numbers exponentially faster than classical algorithms.[42]

This sparked significant interest in the potential of quantum computers to outperform classical computers in both the speed of problem-solving, as well as in solving previously unsolvable complex problems. Subsequently, the late 1990s and early 2000s saw the development of various quantum algorithms, such as the notable Grover's algorithm that outperforms classical methods in searching through unstructured data, and the first experimental realizations of qubits.[43] Over the past two decades, advancements in quantum hardware have led to the creation of small-scale quantum processors. Today, organizations are competing to develop real-world applications across various industries; companies such as D-Wave, which focus on quantum annealing technology tailored for solving specific optimization problems, are seeing promising use cases in industries such as logistics, materials sciences, and supply chain management, while others such as IBM, Microsoft, Amazon, and Google are working on gate-model systems capable of addressing a broader range of challenges that may encounter greater complexity in their implementation.[44, 45]

- **Unlocking real-world quantum applications still requires significant breakthroughs in addressing challenges including scalability, error correction, hardware limitations, and accessibility.** More recently, companies such as IBM and Google, along with numerous academic institutions, have made strides in building more stable and scalable quantum systems. One of the most critical challenges in quantum computing has always been maintaining the stability of qubits, which is essential for reducing computational errors. In 2024, researchers made notable advancements in error correction techniques with the creation of the topological qubit.[46] Technology companies such as Google and Amazon are encouraging quantum innovation via the expansion of quantum cloud services with more powerful processors, which enable businesses and researchers to experiment with quantum computing without the need for their own hardware.
- **Leading financial institutions are also investing in quantum research hoping to discover new breakthroughs and use cases.**

  At SFF2024, **Dr Marco Pistoia, Head of Global Technology Applied Research at JPMorgan Chase**, shared that the institution recently achieved a breakthrough in devising an algorithm that proved the exponential speedup of quantum computing over classical computing.[47]

  However, this is best understood as a theoretical proof of concept (POC); the research team noted that the demonstrated quantum scaling advantage can only be achieved with future improvements in error correction and hardware.[48] Therefore, while research has demonstrated significant computational potential, numerous challenges need to be addressed for quantum computing to viably outperform classical supercomputers in real-world use cases.[49]

**SFF2024 experts agreed that quantum technology represents both a transformative opportunity and a significant security challenge for the financial services industry. As the industry progresses in overcoming hardware limitations, institutions are advised to monitor developments closely.**

- **There are potential opportunities to apply quantum technology in financial services, but practical implementations have yet to materialize due to technical limitations in algorithms and hardware.** As a result, the industry is still in the process of evaluating the value that quantum technology can bring. Financial institutions are actively investing in quantum innovation to better understand and identify relevant use cases, with many setting up teams to research and investigate possible applications for quantum computing.

  **Dr Marco Pistoia, Head of Global Technology Applied Research at JPMorgan Chase**, noted the quantum aspirations of financial institutions, "In finance, two use cases are very important. One is anomaly detection in payments, where you have to automatically identify as soon as possible if there are sanctioned entities in the process of a payment. The same argument can also be applied to fraud detection in credit card payments."[50]

- **Most experiments by institutions are currently in the algorithm exploration phase, with a limited number of POCs.** Quantum use cases of interest to institutions include portfolio optimization, risk management, derivative pricing, and transaction settlements. Some institutions have conducted POCs with algorithms developed for risk, valuation, and cryptography applications, demonstrating that there are potential gains to be made from quantum technology. However, the path to scaling and further practical applications is still being explored.
- **The quantum industry is making progress in addressing the hardware limitations preventing the practical implementation of quantum algorithms.** Quantum technology hardware faces several limitations, including extreme sensitivity to environmental disturbances, which can lead to decoherence and loss of quantum information. Additionally, many quantum systems require stringent temperature conditions, often near to absolute zero, to maintain their quantum states, necessitating bulky cryogenic setups. These factors contribute to the complexity and size of quantum technology installations, making them challenging to scale in practical applications. The industry is actively working on cold quantum technologies that can potentially address this "room-sized machine" problem. By utilizing ultracold atoms, cold quantum technologies can enable the development of more compact and efficient quantum devices that operate effectively in smaller, more accessible environments. Leading financial institutions are closely monitoring advancements in this area and remain optimistic that even an incremental step change in the development of practical quantum devices could still offer substantial benefits. While the industry awaits further developments required to unlock the full potential of quantum technology, institutions are advised to remain patient and vigilant while navigating this evolving landscape.

**Exhibit 8: Hypothesized quantum use cases being researched by financial institutions**

| Institution | Stage of experimentation | Use case of interest | Date<br>Exploration stage: Start of research; POC stage: POC date |
|---|---|---|---|
| **Citi** | Exploration | • Portfolio management | Feb 2024 |
| **Global Banking Group Credit Agricole** | Successful POC | • Valuation of derivatives in capital markets<br>• Anticipated downgrade of counterparties' financial ratings | Jun 2021 |
| **JPMorgan Chase** | Exploration | • Portfolio optimization<br>• Optimization risk analysis<br>• Fraud detection<br>• Hedging algorithm<br>• Option pricing<br>• Trading strategies | 2020 |
| **Goldman Sachs** | Exploration | • Derivative pricing<br>• Risk management | Dec 2019 |
| **Barclays** | Exploration — Unsuccessful POC | • Transaction settlement<br>• Portfolio optimization | Oct 2019 |
| **Deutsche Bourse** | Successful POC | • Risk sensitivity analysis | Mar 2021 |
| **HSBC** | Exploration<br>(Successful POC for post-quantum cryptography) | • Derivatives pricing<br>• Risk management<br>• Portfolio optimization<br>• Fraud detection<br>• Cybersecurity<br>• Natural language processing<br>• Post-quantum cryptography | Oct 2020<br>Sep 2024 (Successful POC for post-quantum cryptography) |
| **Wells Fargo** | Exploration | • Fraud detection<br>• Portfolio optimization | 2019 |
| **Standard Chartered** | Exploration | • Fraud detection<br>• Cybersecurity | Jul 2020 |
| **VidaCaixa (under Caixa Bank)** | Successful POC | • Investment portfolio hedging<br>• Bond portfolio optimization | 2022 |

Source: Oliver Wyman analysis

**SFF2024 also discussed a critical threat posed by quantum technology: its potential to undermine public key cryptography.** Many widely used encryption methods today rely on the difficulty of factoring large integers and solving discrete logarithmic problems. The development of quantum algorithms, such as the Shor's algorithm, possess the theoretical capability to efficiently break these encryption techniques in a fraction of the time it would take classical computers. This poses a critical threat for the financial services industry, where encryption is fundamental to payment security and safeguards financial transactions against unauthorized access. Given the threats to data security and privacy, there is growing interest in post-quantum cryptography solutions that can withstand potential quantum attacks. SFF2024 experts discussed the importance for institutions to act now to mitigate the threat of "Harvest Now, Decrypt Later", where bad actors steal encrypted data today for decryption in the future when quantum algorithms and hardware become available. The SFF2024 discussions covered two potential courses of action that financial institutions are exploring: the migration to quantum-resistant cryptography, and quantum key distribution (QKD).

- **Institutions such as Tencent and HSBC are exploring quantum-resistant cryptography.**
  **Dowson Tong, Executive VP of Tencent**, talked about Tencent's collaborations on post-quantum security, "The risk is that even though quantum technology is not widely available today, there is a chance that people can store encrypted data that's on the wire today, keep it [for] later when the technology is ready, then can break it open. We are talking to a number of institutions, some of them financial institutions [to] look into the post-quantum security paradigm."[51]

  **Colin Bell, CEO of HSBC**, elaborated on HSBC's efforts in applying NIST post-quantum algorithms on tokenized gold trading, "We've been experimenting to make sure that we can apply these new [NIST post-quantum] algorithms to some of our trading activities. We created a tokenized gold product so we can do fractional ownership of gold through distributed ledger technology. We've now applied a NIST post-quantum algorithm to prove you can buy and sell tokenized gold [without] real reduction in the speed of the transaction."[52]

**Both HSBC and JPMorgan Chase are developing technologies related to QKD.**
HSBC is the first bank to successfully test QKD to safeguard a €30 million foreign exchange trading scenario against quantum attacks.[53]

**Colin Bell, the CEO of HSBC**, said, "We've joined a distribution network in the UK with BT and Fujitsu where we do quantum key distribution. We generate quantum keys, which are obviously far more powerful than classically generated keys, and we've used them to protect FX transactions and proven through hardware that we can distribute quantum keys around the network. It's really all part of a journey that every big institution will need to go on, which is preparing themselves for post-quantum cryptography."[54]

JPMorgan Chase successfully used QKD to deploy a high-speed quantum-secured crypto-agile network (Q-CAN).[55]

**Dr Marco Pistoia, Head of Global Technology Applied Research at JPMorgan Chase** stated, "There is another technology that we are working on at JPMorgan Chase called the quantum key distribution. The keys are distributed as quantum states. A quantum state cannot be cloned, [which] makes quantum distribution mathematically secure. At JPMorgan Chase, we are working on both post-quantum cryptography and quantum distribution. The combination of post-quantum cryptography at the application layer, and quantum key distribution at the network layer, is the winning combination to really secure our infrastructure without leaving too much space to attackers, so the attacker space becomes much smaller and perhaps non-existent."[56]

**SFF2024 speakers also discussed the potential for a significant breakthrough in quantum technology in the future.** Speakers advised the industry to **start preparing for it now rather than waiting** for the technology to fully mature. If technological advancements successfully lead to quantum computers that can break encryption, organizations will quickly become vulnerable to bad actors who could use this capability to steal customer data and disrupt operations. Therefore, preparing for a post-quantum world requires organizations to review their encryption standards and understand their vulnerabilities to be "quantum-safe."

**Rajat Taneja, President of Technology at Visa**, recommended organizations to start by preparing for the risks in cryptography, "I'll say [quantum] is coming. It's not tomorrow so you need a plan for your plan. Start with figuring out if [quantum] will impact the security posture in your systems, and how you will move to post-quantum encryption. Then, start thinking strategically about how you can embrace [quantum] at a business level, whether it's optimizations or modeling or other areas."[57]

## F. CONVERGENCE OF AI AND QUANTUM TECHNOLOGY

The convergence of AI and quantum technology represents a potential transformative shift in the landscape of computational capabilities. Viewed as complementary fields, quantum computing has the potential to accelerate machine learning and significantly enhance AI's performance, particularly by enabling faster data processing and optimization.

In the financial services sector, tasks that demand dynamic real-time processing are particularly poised to be supercharged. One example is **fraud detection**. Quantum-enhanced machine learning may be able to quickly sift through millions of transactions, flagging suspicious patterns that may indicate fraudulent behavior, thereby **improving the accuracy and speed of fraud detection systems**. Another example is **risk modeling**. Quantum computing may enhance AI's ability to conduct stress testing and scenario analysis by running complex simulations that consider a wide range of potential market conditions and their impacts, **leading to better-informed decision-making and improved risk management**.

With regard to **credit scoring**, quantum computing may expedite the credit scoring process by analyzing large and diverse data points, enabling lenders to make **quicker, data-driven lending decisions**. Finally, for **payments**, quantum algorithms may enhance encryption methods and optimize payment routing and processing, **leading to faster and more secure transaction processing and operational efficiency**.

Despite the promising potential of this convergence, significant challenges persist. **Current limitations in quantum hardware, the necessity for specialized expertise, and the ongoing development of algorithms capable of effectively harnessing quantum capabilities present substantial hurdles that are unlikely to be overcome in the near future**. Addressing these challenges is crucial for unlocking the full potential of AI and quantum integration, which indicates that these opportunities are primarily accessible to well-funded, advanced companies. Until the time comes for commercialization, the industry remains poised in anticipation of how this convergence can be achieved, which could potentially represent a pivotal moment in financial services technology, where both fields can synergistically elevate each other.

> "AI is beginning to make significant inroads into financial services. We are seeing both AI-powered innovation and potentially AI-driven risks. And if quantum technologies take off, the coupling of AI and quantum computing could unlock huge opportunities as well as present unprecedented security challenges."[58]
>
> Ravi Menon, ex-Managing Director, MAS

# 4

# FUTURE OUTLOOK AND CONCLUSION

As AI and quantum technology advancements continue to reshape the landscape of the financial services sector, organizations face both unprecedented opportunities and challenges. It is essential to proactively adapt to stay competitive and avoid being left behind.

To navigate this evolving environment, there are five calls to action that organizations should embark on:

1. **Chase the value of AI and quantum technology, not the hype:** Focus on initiatives that deliver tangible business value, leveraging pilot projects to validate outcomes and guide investment
2. **Collaborate with industry players and regulators:** Develop partnerships with industry stakeholders and regulators to share insights and lessons, establish best practices, and ensure compliance early on
3. **Educate the workforce and foster a data-driven culture:** Empower employees through training and upskilling, enhancing data literacy and continually promoting a data-driven culture
4. **Reinvent AI governance to drive adoption:** Strengthen AI governance frameworks while focusing on organization-wide adoption through targeted training and support
5. **Cultivate a proactive AI risk management culture:** Establish an integrated AI risk management framework that not only identifies and mitigates emerging risks but also encourages a culture of continuous learning and adaptation

AI and quantum technology advancements present organizations with a unique opportunity to redefine their strategies and operations. By embracing innovative practices, effectively managing risks, and actively exploring the potential of these technologies, coupled with pragmatic regulatory approaches, organizations can contribute to a future where these advancements serve as a catalyst for positive change.

# 5
# ABOUT US

**Singapore FinTech Festival (SFF) 2024**

The Singapore FinTech Festival is a global nexus where policy, finance, and technology communities converge. Designed to foster impactful connections and collaborations, SFF is a platform to explore the intersections of cutting-edge financial solutions, evolving regulatory landscapes, and the latest technological innovations. Through insightful sessions, roundtables, workshops, exhibitions and much more, SFF is an immersive discovery and dialogue of the future trajectories of financial services and the overarching digital transformation reshaping global economies. SFF 2024 welcomed more than 65,000 participants from 134 countries.

**Global Finance & Technology Network (GFTN)**

The Global Finance & Technology Network (GFTN) is a not-for-profit organization established by the Monetary Authority of Singapore (MAS) in 2024 to harness technology and foster innovation for more efficient, resilient, and inclusive financial ecosystems through global partnerships. GFTN organizes convening forums, offers advisory services on innovation ecosystems, provides access to transformative digital platforms, and invests in technology startups with the potential for growth and positive social impact through its venture fund.

**Quotient — AI by Oliver Wyman**

Quotient is Oliver Wyman's global AI offering, bringing decades of hands-on industry specialized experience to help our clients harness the value of AI in everything they do and become AI-centric organizations. We take pride in being impact-makers, assisting our clients in moving beyond the hype about the potential of AI to deliver real value and achieve meaningful outcomes. At the same time, we're constantly looking ahead, striving to keep ourselves and the clients we serve at the forefront of technology. We're prepared to embark on this exciting journey as we empower your organization to thrive in the ever-evolving AI landscape.

# 6

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