Transforming Risk Management and Compliance: Harnessing the Power of Regtech

HONG KONG MONETARY AUTHORITY
香 港 金 融 管 理 局

KPMG

Contents

Foreword

The rapidly evolving external environment and increasingly complex banking business models are driving banks to adapt and embrace innovation and transformation to remain competitive. One important area to the HKMA is Regtech; harnessing the power of technology to create positive transformation of risk management and regulatory compliance processes. The value of Regtech in banking is coming to the fore in Hong Kong, offering clear benefits to banks, customers and regulators.

Much has been done to promote Regtech in Hong Kong to date due to the collective efforts of the banking industry, the HKMA, the technology community and other stakeholders. This includes HKMA initiatives such as the opening up of our Sandbox and Chatroom to Regtech providers, issuing regular publications such as our "Regtech Watch" newsletters, introducing banks to Regtech use cases, and hosting events such as our first AML/CFT RegTech Forum last year.

This white paper builds on this momentum. It sets out the case for wider adoption of Regtech in Hong Kong, and outlines a series of actions that the HKMA will take, or consider taking, to accelerate adoption.

We hope that this white paper can be a useful MAP ('Monitor', 'Assess' and 'Plan') for users. 'Monitor' involves understanding the current and evolving Regtech landscape. 'Assess' involves analysing the existing practices and risks associated with Regtech, and 'Plan' involves putting our insights into practice by developing practical steps for the future.

Our white paper MAP breaks down this process into five key areas:

1. Under **Monitor**, the white paper lays out new developments in Regtech, and explores their importance to Hong Kong's banking industry

2. Under **Assess**, the white paper assesses current prevailing practice and also defines and evaluates the existing barriers to Regtech adoption

3. There are three components under **Plan**. The first involves laying out a common practice framework for implementing Regtech in Hong Kong

4. The second involves making practical recommendations for initiatives that will contribute to the wider adoption of Regtech

5. The final one is delivering a practical roadmap of the HKMA's plans for promoting Regtech adoption over the next two years.

We believe that this white paper will encourage banks in Hong Kong to actively consider the business challenges that can be solved with Regtech. We want to see banks embracing and trialling new technologies and proofs of concept, and ultimately adopting more Regtech solutions. There are also opportunities for the Regtech community to develop their solutions for the Hong Kong market.

We would like to thank all the survey respondents and interviewees who contributed to this white paper.

Arthur Yuen
Deputy Chief Executive
HKMA

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Executive summary

The rise of 'Regtech' – the use of technologies that enhance efficiency and/ or the effectiveness of risk management and regulatory compliance – presents opportunities to unlock significant benefits for banks, regulators and the wider economy. Significant progress in facilitating Regtech adoption in Hong Kong has already been made and technologies are becoming increasingly powerful.

If the key barriers to adoption can be overcome, then Regtech adoption and the realisation of these significant benefits can be accelerated.

Banks' evolving business models, regulatory initiatives in response, and a challenging external environment continue to drive banks to explore the use of technology to enhance risk management and compliance. Technology is becoming increasingly powerful across both established and emerging areas, such as artificial intelligence, cloud and distributed ledgers. The traditional lens through which banks and regulators view compliance is changing, creating significant opportunities to leverage Regtech solutions across a wide range of application areas.

Against this backdrop, the Hong Kong Monetary Authority (HKMA) commissioned KPMG to develop a white paper to explore the current state of Regtech in Hong Kong, examine common practices and barriers to adoption, and outline a

roadmap to accelerate adoption in the banking sector. The research for this white paper is based on surveys conducted with local banks and Regtech providers, as well as in-depth interviews with banks, Regtech firms, local and overseas regulators and other industry stakeholders.

Key findings

- Substantial progress in facilitating Regtech adoption has been made in Hong Kong in recent years. Initiatives from the regulators, the growth and increasing role of relevant industry associations, and the presence of local and international Regtech firms are all recognised as positive developments.

- The effective implementation of Regtech solutions can reduce cost, improve risk management and increase efficiency for banks, as well as enhance supervision for regulators. More widespread adoption would also help to strengthen Hong Kong's position as an international financial centre, maintain the banking sector's competitiveness, and help Hong Kong fulfil its pivotal role in the Greater Bay Area's development.

- One-third of the surveyed banks have fully implemented at least one Regtech solution; there are significant opportunities to encourage banks that have yet to implement Regtech and those that have already adopted solutions to improve implementation and expand use cases into emerging areas.

- 26 specific application areas have been identified across six broad fields: Regulatory Compliance Obligations, Financial Crime, Conduct & Customer Protection, Regulatory & Tax Reporting, Risk Management, and Governance & Accountability. As a result of Regtech developments driven by the HKMA, financial crime, risk management and regulatory reporting are viewed as the areas with more mature solutions in Hong Kong. There are significant opportunities for banks to adopt solutions in these areas, and to explore new solutions in emerging application areas.

- Budgetary and capability constraints, as well as the lack of available and established solutions catering to local requirements are the main adoption challenges for banks and Regtech providers. There is a need for targeted intervention in order to overcome these challenges.

Recommendations

The extensive research culminated in the formulation of 16 recommendations across five core areas which, if realised, would help to achieve a **number of goals:**

- Hong Kong as a global leader in Regtech

- Extensive adoption of Regtech in the Hong Kong banking sector

- Breeding ground of Regtech solutions for financial institutions

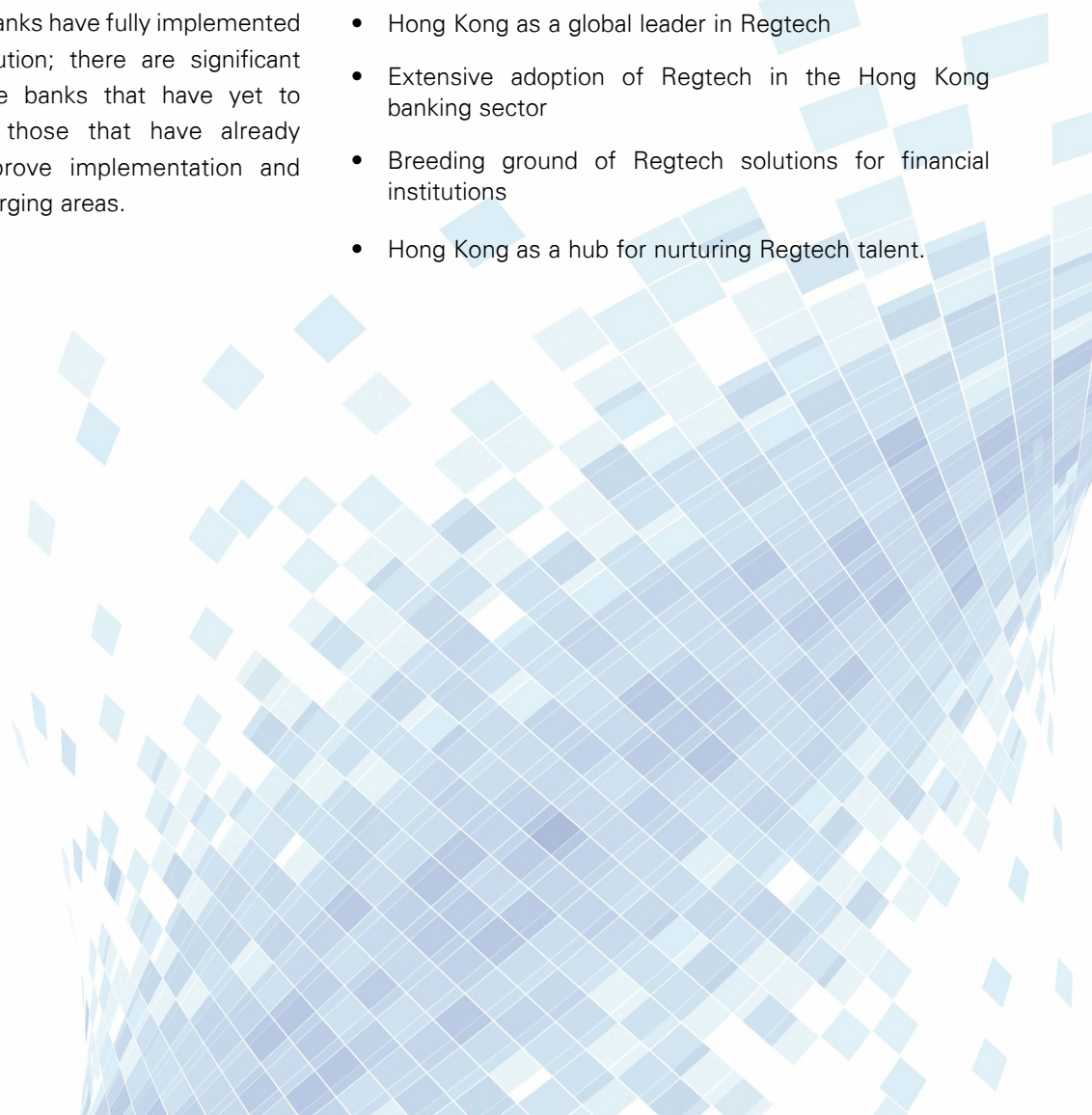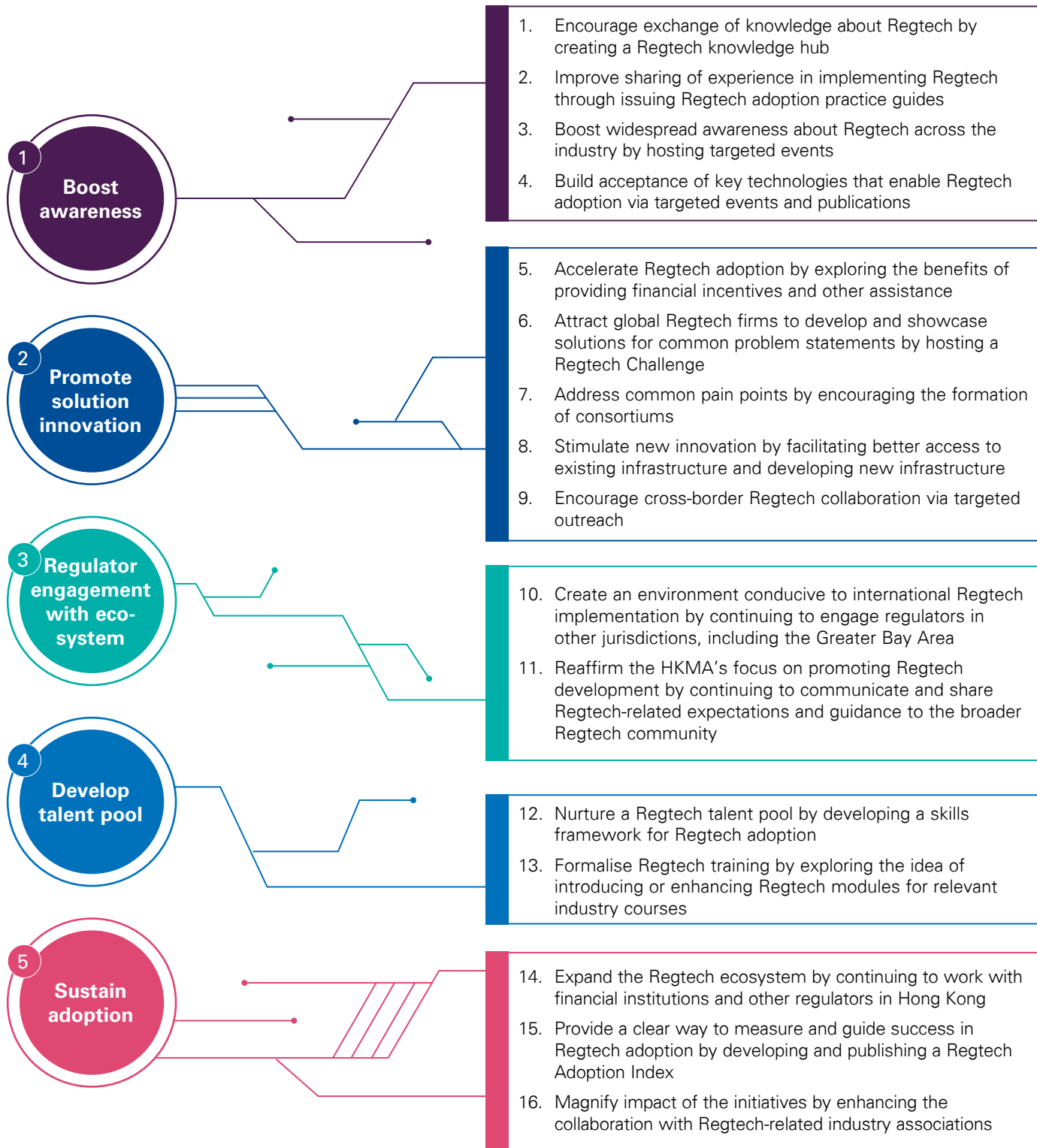- Hong Kong as a hub for nurturing Regtech talent.

Figure 1: Overview of recommendations

1. Boost awareness

1. Encourage exchange of knowledge about Regtech by creating a Regtech knowledge hub
2. Improve sharing of experience in implementing Regtech through issuing Regtech adoption practice guides
3. Boost widespread awareness about Regtech across the industry by hosting targeted events
4. Build acceptance of key technologies that enable Regtech adoption via targeted events and publications

2. Promote solution innovation

5. Accelerate Regtech adoption by exploring the benefits of providing financial incentives and other assistance
6. Attract global Regtech firms to develop and showcase solutions for common problem statements by hosting a Regtech Challenge
7. Address common pain points by encouraging the formation of consortiums
8. Stimulate new innovation by facilitating better access to existing infrastructure and developing new infrastructure
9. Encourage cross-border Regtech collaboration via targeted outreach

3. Regulator engagement with eco-system

10. Create an environment conducive to international Regtech implementation by continuing to engage regulators in other jurisdictions, including the Greater Bay Area
11. Reaffirm the HKMA's focus on promoting Regtech development by continuing to communicate and share Regtech-related expectations and guidance to the broader Regtech community

4. Develop talent pool

12. Nurture a Regtech talent pool by developing a skills framework for Regtech adoption
13. Formalise Regtech training by exploring the idea of introducing or enhancing Regtech modules for relevant industry courses

5. Sustain adoption

14. Expand the Regtech ecosystem by continuing to work with financial institutions and other regulators in Hong Kong
15. Provide a clear way to measure and guide success in Regtech adoption by developing and publishing a Regtech Adoption Index
16. Magnify impact of the initiatives by enhancing the collaboration with Regtech-related industry associations

Source: KPMG analysis

The value of Regtech in banking is being brought to the fore in Hong Kong, with industry stakeholders starting to realise that Regtech and its underlying technologies are the way of the future for risk management and compliance. Hong Kong has the right foundations to support a thriving Regtech ecosystem: broader fintech capabilities, strong support for technology businesses, a large and established financial services sector, and supportive regulators. Our hope is for this white paper to encourage banks in Hong Kong to actively consider the business challenges that can be solved with Regtech, embrace and trial new technologies and proofs of concept, and ultimately accelerate the adoption of more Regtech solutions.

> *The HKMA is taking a proactive role in facilitating Regtech adoption. The HKMA will work closely with the banking industry, the Regtech community and relevant government agencies to increase interaction and collaboration among these stakeholders.*
>
> **Raymond Chan**
> *Executive Director (Banking Supervision), HKMA*

About the research

The HKMA-KPMG research for this white paper is based on:

- A survey of **133 Authorized Institutions** in Hong Kong, conducted in July and August 2020.

- A survey of **47 Regtech providers**, conducted in July and August 2020.

- Interviews with over **70 individuals** from a range of banks, Regtech providers, local and overseas regulators, and industry associations.

- **Analysis of public reports and publications on Regtech**, its related technologies, and its application areas and use cases.

- **Subject matter expertise** across the HKMA and the KPMG network.

We would like to take this opportunity to thank all the survey respondents and interviewees who kindly contributed to this white paper.

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The importance of Regtech to Hong Kong's banking industry

2.1 Development of Regtech

Regtech emerged in the late 2000s and has matured significantly in the past five years.

Financial institutions have been using technology to improve the effectiveness and efficiency of their risk management and regulatory compliance activities long before the term "Regtech" was coined. Regtech in its current form emerged in the late 2000s as financial institutions and providers began to harness a new generation of technologies, such as cloud, artificial intelligence (AI) and application programming interfaces (APIs), in a range of solutions under the wider umbrella of fintech.

The growing volume of regulation designed to reduce risk in the financial system following the Global Financial Crisis and high-profile anti-money laundering (AML) scandals have further accelerated the development and adoption of Regtech in its current form. Although the rate of

increase in new regulation has eased in recent years, the volume of regulatory alerts^ remains high in a historical context, numbering more than 56,000 in 2019 according to Thomson Reuters (Figure 2), or approximately one new regulatory alert every nine minutes.

The term "Regtech" was coined by the UK Government Office for Science in their 2015 Fintech Futures Report[1]. The creation of the term Regtech as a sub-set of fintech has since gone on to help raise awareness and stimulate interest among financial institutions and service providers alike. Today, many regulators have some form of guidance or initiatives that are designed to promote the use of Regtech. There is significant interest from investors with total global investment activity in Regtech hitting USD 3.4 billion in 2019. Data from the first half of 2020 suggests that investment activity could surpass this figure in 2020 (Figure 3).

Regtech is expected to continue to grow as we enter the 2020s amid emerging new risks from increasingly digital business models and a challenging external environment. There is also an increasing expectation from both the regulators and the public for banks to maintain a high level of risk management, and to act in the best interests of consumers and the market. As banking becomes more complex, there is a growing need to meet these expectations in a cost-effective manner through Regtech solutions.

Increasing digitalisation is a well-established trend in the financial services industry. The onset of COVID-19 is likely to accelerate the adoption of digital technologies and raise awareness about available technologies and solutions in the market, as well as their benefits.

Figure 2: Number of regulatory alerts generated per year
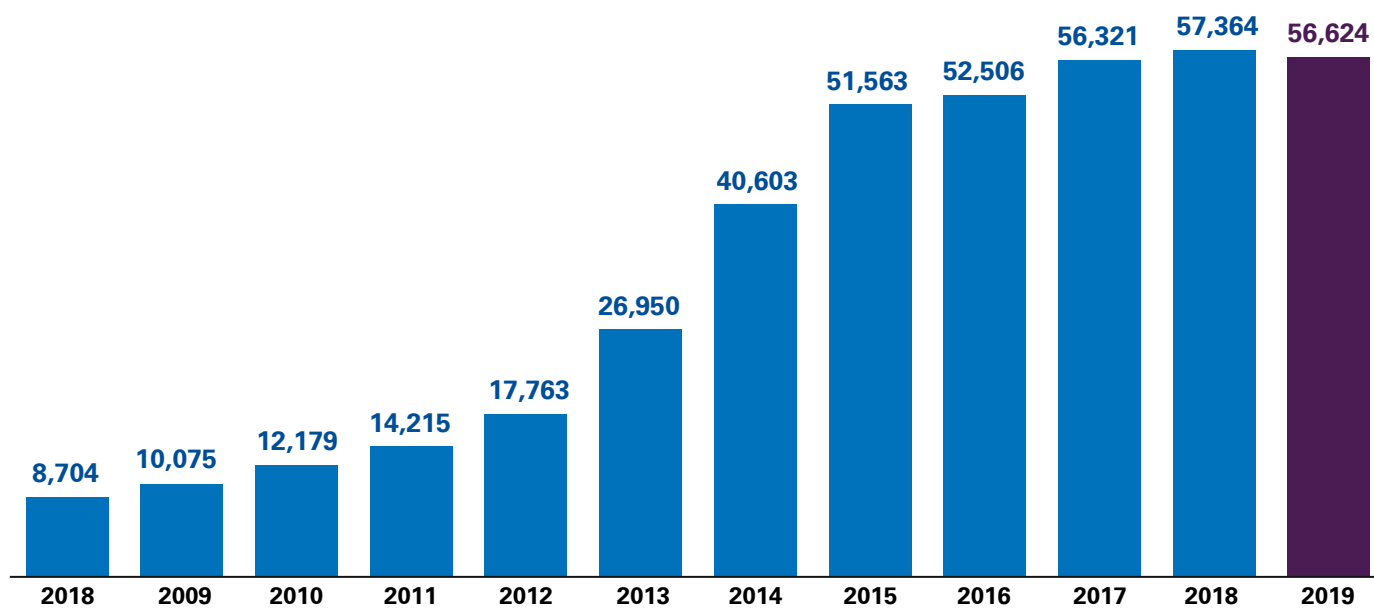
Source: Regulatory Intelligence Feeds, Thomson Reuters (2020), https://legal.thomsonreuters.com/content/dam/ewp-m/documents/legal/en/pdf/brochures/tr_regulatory_intelligence_desktop_digital_us.pdf

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^ Notification based on regulatory news, including circulars, guidance and other announcements, that is captured by Thomson Reuters Regulatory Intelligence
[1] Fintech Futures – The UK as a World Leader in Financial Technologies, UK Government Office for Science (April 2015), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/413095/gs-15-3-fintech-futures.pdf

Figure 3: Total global investment activity (Venture Capital, Private Equity and Merger & Acquisition) in Regtech
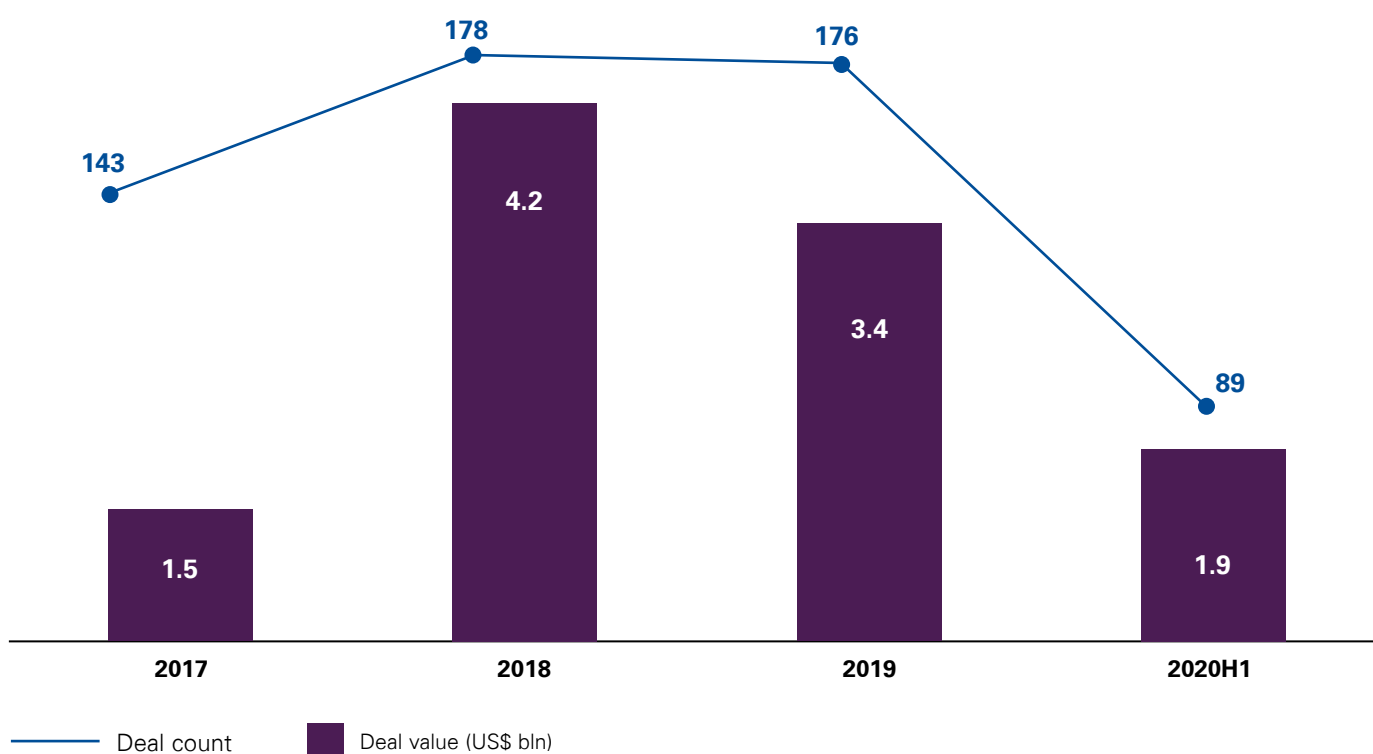
Source: Pulse of Fintech H1 2020, KPMG (September 2020), https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/09/pulse-of-fintech-h1-2020.pdf

2.2 The benefits of Regtech

Greater Regtech adoption in Hong Kong offers clear benefits to financial institutions, customers, regulators and to overall economic growth.

Benefits to financial institutions

Enhanced risk management: A key benefit of greater Regtech adoption is the harnessing of new technologies to enable financial institutions to better manage a wide range of risks. The financial and reputational consequences of poor risk management can be significant. Globally, financial institutions have paid more than USD 340 billion in fines since the Global Financial Crisis[2], and continue to face regulatory penalties related to lapses in market conduct, AML systems, regulatory reporting, information and consumer protection. Alongside the significant fines are the costs of remediation, which can be multiples of the fines paid.

Regtech offers a number of benefits to improve compliance and risk management.

- Reduces human error: Regtech solutions tend to be highly automated and require less human intervention. They can therefore reduce the operational errors associated with maintaining heavily manual paper and email-based processes.

- Enhances monitoring/ sampling: Regtech solutions can facilitate faster analysis and checking of larger quantities of data, enabling a more comprehensive review of large data sets as compared to a sample-based approach.

- Facilitates predictive analytics: Regtech solutions can equip financial institutions with new or improved predictive analytics that trigger earlier investigations of potential issues, for example in fraud detection and default risk management.

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[2] Regtech Beyond Compliance, KPMG (March 2020), https://home.kpmg/xx/en/home/insights/2019/03/beyond-compliance-fs.html

- Enables professionals to focus on higher value tasks: By automating process-orientated tasks, Regtech solutions can enable professionals to focus on more value-added tasks such as dealing with regulatory change and advising front office functions.

Reduced costs: Cost management has been a key focus for financial institutions in recent years, and is becoming an increasingly important lever in maintaining profitability amid the challenging business environment exacerbated by COVID-19. If implemented correctly, Regtech can bring significant cost advantages to financial institutions. Interviewees highlighted the growing importance of cost reduction as a reason for Regtech adoption. According to one study, global regulatory compliance spending is expected to increase from approximately USD 278 billion in 2019 to more than USD 316 billion by 2024[3]. Research also shows that a typical bank serving 10 million customers can potentially save up to 40% in costs annually by implementing technology to improve KYC processes[4].

Attract and retain customers: Regtech solutions can help to enhance customer experience by allowing required compliance checks to be completed more efficiently, delivering a faster and more efficient service. Regtech can therefore be leveraged by financial institutions as a competitive advantage that can aid in attracting and retaining customers.

Benefits to customers

Improved customer experience: Regtech provides significant opportunities to improve customer experience. Regulatory requirements are often cited as a reason for slow service. The adoption of technologies such as Optical Character Recognition (OCR) and AI can help speed up the processing of regulatory compliance checks. The recently launched virtual banks in Hong Kong, which use these technologies, have shown so far that regulatory requirements can be met while raising the bar for customer experience.

There are also benefits in terms of opportunity costs as the effective use of Regtech can free up front office staff to spend more time focusing on their customers.

For example, relationship managers in the private wealth management industry in Hong Kong spend about 42% of their time on administration-related work[5], which includes complying with a range of on-boarding, suitability and disclosure requirements. The use of Regtech solutions could reduce the time spent on such administration-related work.

Drives financial inclusion: While considerable efforts[6] have been made over the past few years, there are still certain customer segments that experience difficulties transacting or opening accounts due to financial institutions' concerns around regulatory compliance. For example, 10% of small-to-medium enterprises in Hong Kong find it challenging to open bank accounts and 31% find it challenging to get access to credit[7]. The adoption of Regtech solutions using alternative data could be used to help assess customer and credit risk and improve access to financial services.

Benefits to regulators

Reduced risk in the financial system: The effective implementation of Regtech by financial institutions can help to reduce residual risks at the institutional level and should, in aggregate, equate to better management of risk in the financial system.

Enhanced supervision: Most supervisory agencies have historically collected summarised data on a periodic basis. Regtech presents opportunities to transform this approach by allowing reporting institutions to automatically package business data in a much more granular form on a more timely basis. This can help regulators rapidly respond to changing conditions, for example in a crisis.

Increased efficiency: The adoption of Regtech by financial institutions can help regulators carry out their supervisory activities more efficiently. For example, addressing minor inconsistencies in regulatory reporting can draw attention away from more pressing priorities. This could be a particular issue for the large number of foreign bank branches that may have staff seconded from their home jurisdiction, and who may need time to get up to speed with local requirements.

[3] Regtech Spending to Reach $127 billion by 2024, as AI Drives Cost Savings, Juniper Research (September 2019), https://www.juniperresearch.com/press/press-releases/regtech-spending-to-reach-$127-billion-by-2024

[4] Regtech 3.0: Easing the Cost of Compliance, International Banker (February 2020), https://internationalbanker.com/finance/regtech-3-0-easing-the-cost-of-compliance/

[5] Hong Kong Private Wealth Management Report 2018, KPMG PWMA (September 2018), https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2018/09/hong-kong-private-wealth-management-report-2018.pdf

[6] Introduction of Tiered Account Services, Hong Kong Monetary Authority (April 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20190412e1.pdf
Credit Risk Management for Personal Lending Business, Hong Kong Monetary Authority (May 2018), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2018/20180509e1.pdf
Guidelines on Credit Risk Management for Personal Lending Business, Hong Kong Monetary Authority (August 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20190829e1.pdf

[7] Survey on Small and Medium-Sized Enterprises' Credit Conditions for Second Quarter 2020, Hong Kong Monetary Authority (July 2020), https://www.hkma.gov.hk/eng/news-and-media/press-releases/2020/07/20200729-4/

^Authorized institutions, as defined by the HKMA, include licensed banks, restricted licence banks and deposit-taking companies.

Benefits to Hong Kong

Enhances the competitiveness of the banking sector: Hong Kong has a thriving banking industry with 194 Authorized Institutions (banks) that are important contributors to the economy. The banking industry alone employed over 100,000 skilled professionals and contributed more than HKD 349 billion to GDP (12.9% of total GDP) in 2018[8]. A key component of the HKMA's Banking Made Easy initiative, greater Regtech adoption and the associated risk management, cost and customer experience benefits can help to increase the competitiveness of Hong Kong's banking industry.

Strengthens Hong Kong's status as an international financial centre: As a leading global financial centre, Hong Kong remains a global leader for IPOs and an important hub for wealth management, asset management and insurance. Many Regtech use cases extend beyond the banking industry, so the more widespread adoption of Regtech is likely to benefit other sectors and boost Hong Kong's overall global competitiveness. Furthermore, recent government initiatives to promote Hong Kong as an asset management hub – such as the new Limited Partnership Fund regime, updates to offshore funds tax exemption and the open-ended fund company regime – could help to attract more private equity funds to set up onshore. The launch and growth of domestic Regtech companies may present attractive investment opportunities for the growing number of private equity and venture capital firms in Hong Kong.

Promotes Hong Kong's development as an innovation and technology hub: The greater adoption of Regtech supports the wider ambitions of the Hong Kong SAR Government to transform Hong Kong into an innovation and

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[8] The Four Key Industries and Other Selected Industries, Census and Statistics Department (2018), https://www.censtatd.gov.hk/hkstat/sub/sp80.jsp?tableID=188&ID=0&productType=8

technology hub. This has long been an ambition set out in numerous addresses from the Hong Kong Chief Executive. In recent years, this has led to a range of initiatives such as the expansion of Cyberport, the development and location of research institutions in Hong Kong Science & Technology Park, research and development (R&D) tax incentives, and immigration and cross-border technology cooperation. Encouraging more financial institutions to use advanced technologies such as Regtech would help to grow the vendor ecosystem and deepen the talent pool for relevant skills.

Supports Hong Kong's role in the Greater Bay Area: Hong Kong has a crucial role to play in the development of the GBA. As identified in the *Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area*[9], Hong Kong should leverage its position as an international financial, asset management and risk management centre,

and offshore RMB hub. The city's other goals include promoting the development of high-end industries, strengthening innovation and technology, nurturing emerging industries and increasing global competitiveness. The greater adoption of Regtech would facilitate Hong Kong in fulfilling its role in the GBA's development, leading to significant growth and benefits for both technology companies and financial institutions in the region.

Strengthens Hong Kong's role as an East-West connector: Hong Kong's key role in connecting companies from the region and worldwide could see more financial institutions and technology companies invest in and pilot Regtech solutions in Hong Kong before rolling them out to other markets. This could help to lead to more widespread adoption of Regtech in Hong Kong.

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9 Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area (February 2019), https://www.bayarea.gov.hk/filemanager/en/share/pdf/Outline_Development_Plan.pdf

2.3 The underlying technologies

Regtech solutions are expected to become increasingly powerful as the underlying technologies mature.

Overview of underlying technologies used in Regtech

Regtech is underpinned and enabled by a number of prominent emerging and established technologies. These vary from more established technologies such as cloud to more emerging areas of Natural Language Processing (NLP) and the Internet of Things (IoT). As these technologies continue to evolve and mature, they are expected to enable the creation of more powerful solutions. The key technologies that underpin and enable Regtech solutions are further detailed below.

Key underpinning technologies

- **Cloud computing** is the on-demand delivery of IT resources over the internet, typically computing power or data storage. This enables financial institutions to operate with lower costs without the need to purchase and maintain equipment, to have greater flexibility to generate, store, manage and use data, along with enhanced data security and advanced data protection. This also enables users to access applications at any time, from any location and from any device. Many Regtech solutions are cloud-based and therefore use cloud computing as a key underpinning technology. Emerging anecdotal evidence suggests that financial institutions that were open to using cloud-based technology have been more successful in adopting Regtech solutions during the COVID-19 pandemic, and have therefore displayed greater operational resilience.

- **Application Programming Interface** is a computer programming approach for facilitating exchange of information and executing instructions between different computer systems. Given the complexity of banking systems and the need for Regtech solutions to smoothly interface with banks and other third parties, API is a crucial underpinning technology for Regtech adoption.

Emerging technologies

- **Artificial Intelligence** is an overarching concept that refers to different emerging technologies by mimicking cognitive functions of humans such as problem-solving, speech recognition, visual perception, decision-making and language translation. AI can help to automate business processes, detect patterns, generate insights, and engage customers and employees through routine communications. Specifically, AI can help analyse and interpret data at scale and in real-time. This provides predictive insights and alerts on a timely basis for more comprehensive risk monitoring.

- **Machine Learning** is a branch of AI and a popular technology that is expected to have a transformational impact on companies in the coming years. Machine learning enables continuous improvement and more accurate and predictive analytics from large and more complex data sets.

- **Natural Language Processing** is a branch of AI that allows systems to recognise and interpret meaning from human languages, and creates a means of two-way communication between systems and users. Both text and audible speech can be analysed or generated using either a symbolic approach (rules set by linguistic experts), statistical approach (models generated based on observed samples), or both. It is commonly used in fintech and Regtech solutions in applications such as chatbots and tools that automate the process of gathering customer information from a wide range of sources.

- **Optical Character Recognition** is a form of technology that identifies and converts text from a variety of documents into digitised data. It enables mass extraction of information from a wide range of sources that would otherwise require labour intensive manual data entry. OCR acts as an enabler of other technologies that underpin Regtech solutions by converting information into data in a format that allows for consumption by machine learning, NLP and other techniques that benefit from larger data sets.

- **Internet of Things** is a system that connects devices to the internet, enabling more real-world data to be collected, interpreted and used, and improving productivity with the ability to monitor and control a wider range of processes. With larger adoption of digital devices, IoT can increasingly be leveraged by banks for a range of uses. For example, sensors installed in warehouses and ports can track raw materials and inventory stocks to check for fraud or financial crime if goods move through sanctioned ports. Consumer applications include comparing mobile phone location data and transaction data to identify fraud.

- **Distributed Ledger Technology (DLT)** is a modern database system using Blockchain technology. It is commonly used to record transactions of assets, providing a secure, immutable and auditable trail of information about the asset. The technology does so by encrypting the available information and storing it across multiple servers at the same time. In the realm of Regtech, DLT provides a way of constructing a secure record system that offers increased transparency, trust and provenance of data to multiple parties in real time.

- **Biometrics** use the unique biological characteristics of an individual to verify their identities, providing greater security and assurance on identity verification, and offering a better user experience with more convenient processes. Virtual banks in Hong Kong are using biometric checks to enable remote on-boarding, bypassing the need for physical identity checks, hence reducing on-boarding time, and enhancing flexibility and customer experience.
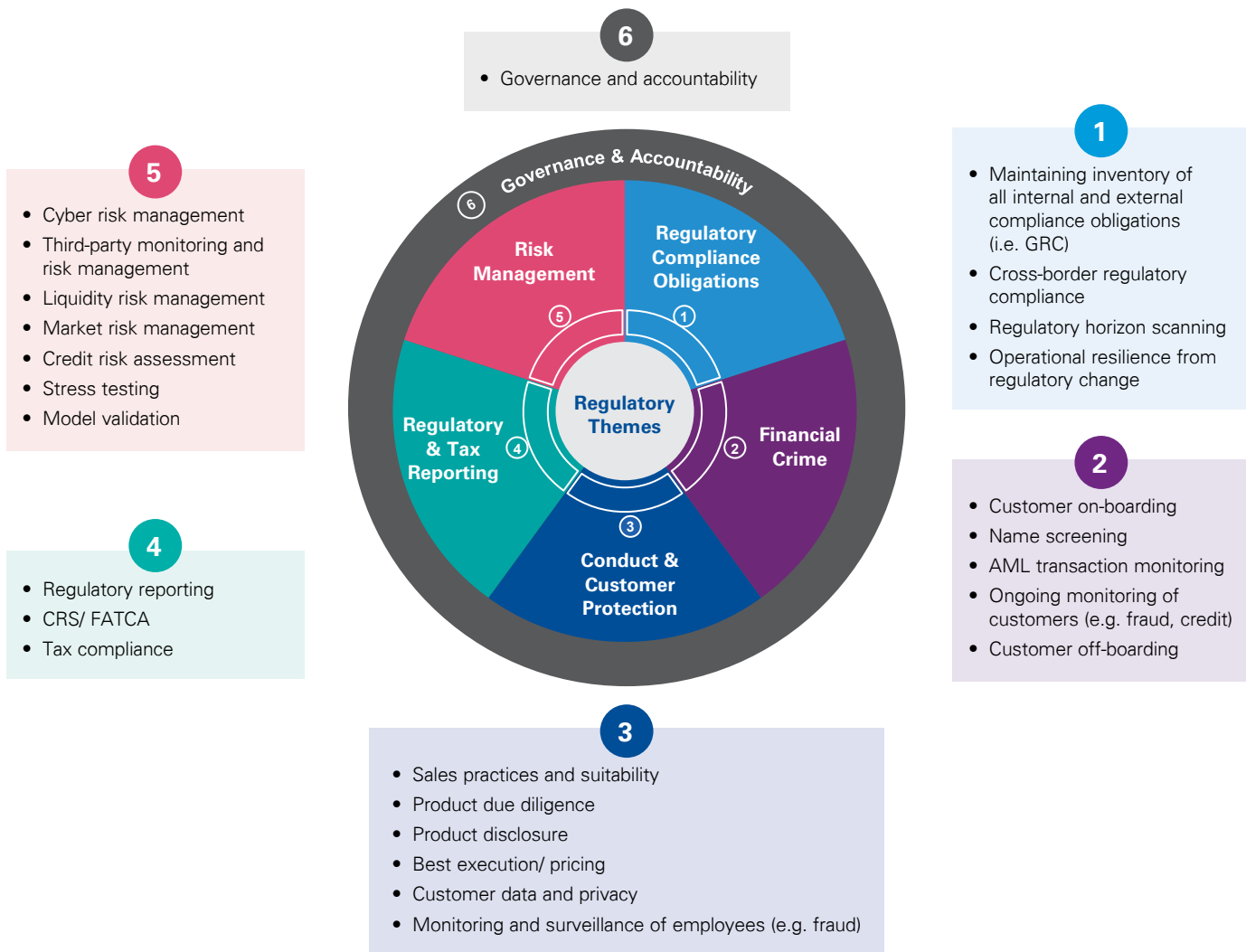
2.4 Regtech application areas

26 specific Regtech application areas have been identified for the purpose of this white paper, which present opportunities to realise benefits for financial institutions.

There are many exciting new use cases being investigated on a daily basis, to the extent that generating a comprehensive list is challenging. The 26 application areas identified in the survey outline the more prominent examples seen in the banking industry (Figure 4).

Figure 4: Overview of Regtech application areas

6
- Governance and accountability

5
- Cyber risk management
- Third-party monitoring and risk management
- Liquidity risk management
- Market risk management
- Credit risk assessment
- Stress testing
- Model validation

1
- Maintaining inventory of all internal and external compliance obligations (i.e. GRC)
- Cross-border regulatory compliance
- Regulatory horizon scanning
- Operational resilience from regulatory change

4
- Regulatory reporting
- CRS/ FATCA
- Tax compliance

2
- Customer on-boarding
- Name screening
- AML transaction monitoring
- Ongoing monitoring of customers (e.g. fraud, credit)
- Customer off-boarding

3
- Sales practices and suitability
- Product due diligence
- Product disclosure
- Best execution/ pricing
- Customer data and privacy
- Monitoring and surveillance of employees (e.g. fraud)

Source: KPMG

Regulatory compliance obligations

- **Maintaining inventory of all internal and external compliance obligations** is often managed in an integrated and organisation-wide Governance, Risk and Compliance (GRC) platform. The successful implementation of GRC strategies maximises the effectiveness of an organisation's control framework while driving consistency, transparency and efficiency across the three lines of defence. GRC solutions are technology-enabled products and services that integrate, streamline, and maximise the efficiency and value of an organisation's GRC strategy, providing a

single source of truth. The next generation of solutions should be capable of monitoring regulatory obligations and updating regulatory inventories for changes in the regulatory environment, with as few manual processes as possible. This can significantly reduce the resource-intensity of traditional processes.

- **Cross-border regulatory compliance** involves tracking and complying with other regulatory requirements across jurisdictions. This is particularly important for Hong Kong given the volume of business covering multiple regulatory environments, as well as the regional nature of many business and operating

models across Asia-Pacific. Regtech solutions in this area should contribute to a centralised GRC platform, providing financial institutions with an effective means of monitoring and ensuring compliance with regulatory obligations in all relevant jurisdictions. This means that compliance teams can be more centralised with fewer resources.

- **Regulatory horizon scanning** involves tracking, identifying and monitoring relevant regulatory changes and determining their impact across the institution. Horizon scanning is an important component of a successful regulatory change management system. A major challenge in this area is building the capability to identify new or changing sources of regulations, particularly when a jurisdiction undergoes a major change to its regulatory framework or environment (e.g. structural changes to key regulators, changes in a regulator's mandate or the creation of new regulators). With advancements in OCR engines and the potential for regulators to adopt machine-readable regulations (MRR) in the future, Regtech capabilities in this area have the potential to become increasingly powerful, especially when integrated into an enterprise-wide GRC platform.

- **Operational resilience from regulatory change** is the strengthening of system and process resilience to enable an institution to continue to operate as regulatory requirements change. This closer view on how regulations impact operations is what distinguishes this area from the regulatory inventory and horizon scanning operational areas.

Financial crime

- **Customer on-boarding** refers to establishing a business relationship with a customer, a crucial part of which is the Know Your Customer (KYC) process, which involves determining the true identity of the customer and understanding the customer's background, including the type of activity that is expected to enable the bank to assess money laundering and terrorist financing risk. Remote customer on-boarding refers to customer on-boarding processes solely through electronic channels such as mobile applications or the internet. A significant portion of the Regtech pilot trials conducted in the HKMA's Fintech Supervisory Sandbox 2.0 have also been related to remote on-boarding. A variety of authentication technologies underpin these solutions, including machine learning, facial recognition, geo-location recognition and liveness detection, have been adopted by retail banks. For example, in a

two-stage verification process, machine learning can be applied to ascertain the authenticity of the identification document uploaded by a customer (i.e. identity authentication), and then a combination of facial, liveness and geo-location recognition may be used to confirm that the person on-boarding is indeed the person that owns the identification document (i.e. identity matching). Information about the customer's background and expected activity is collected digitally, with the customer's authorising signatures replaced by multi-factor authentication using a combination of biometrics, passwords or one-time passwords.

- **Name screening** of new and existing customers and payments helps ensure compliance with relevant legislation and regulations. Enhanced checks on matches are required to determine whether they are genuine hits. The global nature of relationship networks and databases means that solution providers benefit from scale advantages, favouring global players. Traditional manual methods are slow and resource intensive, and often provide limited information that fails to capture the full network of relationships. Using advanced data mining techniques, Regtech solutions have the potential to quickly and efficiently identify high-risk entities and individuals. Process automation and machine learning can also help to tackle the manual review of matches, increasing overall efficiency.

- **AML transaction monitoring** aims to detect unusual activity, based on the understanding of the customer's background and account opening purpose. Traditional systems typically use rules-based algorithms calibrated to a set of pre-defined scenarios and thresholds that have been determined to identify patterns of potentially illicit activities, subject to further investigation by analysts. However, the large volume of false-positives generated by rules-based methods is a well-documented industry challenge, and one that Regtech solutions are seeking to resolve. These solutions tend to use supervised machine learning techniques, using the large volume of transactions as training data to identify common patterns in order to prevent incorrectly flagging and/ or reduce the volume of certain types of false-positives in the future.

- **Ongoing monitoring of customers** involves continuous review of the customer's information to refresh the institution's understanding of the customer's personal, professional or economic situations, activities and transactions. This is key to having the ability to identify potential changes in the customer's financial crime

risk profile and take measures to mitigate any risks. Regtech solutions in this area make use of continuous data gathering on the customer from public sources and subscribed databases, and flag only the news items that are relevant in the context of financial crime risk. For example, AI can flag a media report on a customer becoming the subject of a criminal investigation for review, while discarding reports of a non-criminal nature.

- **Customer off-boarding** is often overlooked as a process to identify and off-board customers for risk-related reasons. Customer profiles should be reviewed periodically or when an event occurs that impacts the customer's risk profile, especially when it is related to financial crime such as tax fraud and identity fraud. Although these customers are flagged by ongoing monitoring processes, it can become an operational burden if these accounts are not closed despite the ceasing of business relationships. Best practices involve proactively managing and removing inactive customer accounts to minimise the cost of maintaining them. Regtech solutions can help reduce the manual administrative work required to off-board customers by streamlining and automating parts of the process, such as the intelligent generation of customer communications with automated delivery.

Conduct & customer protection

- **Sales practices and suitability** refers to the reasonable steps that banks are expected to take in order to ensure that investment solicitation and recommendations are suitable for a particular customer. Regtech has the potential to help in three ways. First, by providing the tools to assist frontline staff in minimising manual processes when conducting a suitability assessment. Second, by increasing compliance rates of frontline staff which can reduce the burden on second line risk and compliance staff, and third, by providing the tools to assist second line risk and compliance staff in automating parts of the monitoring process. For example, there are tools that automate the risk profiling of customers and aim to reduce bias in risk profiling questionnaires.

- **Product due diligence** should be conducted by banks in order to obtain a thorough understanding of the investment products being solicited or recommended to customers. The mechanism for assessing product risks and assigning product risk ratings to investment products should be reasonable and take into account all relevant factors. There are a number of challenges in this area that Regtech could potentially address.

For example, solutions that can automatically take local regulatory requirements and market circumstances into consideration could help reduce the burden on local staff in conducting due diligence on products where the work had already been performed by the head/ regional office outside of Hong Kong.

- **Product disclosure** should be adequately provided to customers, varying in detail depending on the product nature and complexity. This covers any material and advice provided at the promotional, sales and advice, and post-sale stages. Preliminary compliance checks of promotional materials are typically performed manually by product managers and escalated to, and signed off by, compliance staff. There are Regtech firms that are developing tools to help product managers identify compliance issues early, which can reduce reliance on compliance teams and assist them by automating parts of the compliance assessment process. Some tools are able to analyse image, voice and video files, and assess against both prescriptive and principle-based regulations to determine whether there is a potential breach.

- **Best execution/ pricing** refers to the obligation to deliver best execution of trade orders on behalf of customers on the best available terms given the existing market environment. With the increasing regulatory focus on best execution monitoring, Regtech solutions can help benchmark trade details to monitor pricing quality, execution latency and order slippage. This provides financial institutions with better information to systematically monitor and review trading activities for potential compliance issues in a timely manner. Effective solutions also provide a competitive advantage by generating sustainable value for clients.

- **Customer data and privacy regulations** are increasing around the world both in importance and in reach. Protecting the confidentiality of customer data and implementing relevant security controls to prevent and detect any loss or leakage of data are becoming increasingly challenging and labour-intensive. Regtech solutions in this area can help companies comply with these regulations.

- **Monitoring and surveillance of employees** is important to ensure regulatory compliance and to identify a broad range of potential issues related to conduct (e.g. insider trading, fraud and misconduct), performance, culture and sentiment. Use cases are emerging in each of these areas with a wide range of emerging technologies. For example, NLP and voice

analytics can be applied to employees' communications with customers to identify potential signs of stress or negative sentiment. This allows for the early detection of risk and enables timely intervention, which could potentially protect revenue or save costs.

Regulatory & tax reporting

- **Regulatory reporting** involves the submission of raw or formatted data – prudential returns, for example – as required by regulators to evaluate and track the financial and operational status and compliance of the institution. The trend towards increasing reporting requirements, with more granularity and frequency and for both local and extra-territorial regulations, is a key challenge for financial institutions. Unstructured data, difficulties in tracking data sources and ineffective risk data calculation are also key challenges. Cloud-based and AI-powered Regtech solutions can help to automate and streamline regulatory reporting processes to improve reporting timeliness, accuracy and effectiveness, thus reducing risks and costs.

- **The Common Reporting Standard (CRS) and the Foreign Account Tax Compliance Act (FATCA)** have changed the tax information reporting landscape worldwide. CRS calls for the automatic exchange of information obtained from financial institutions between more than 100 jurisdictions, while FATCA requires foreign financial institutions to report on the assets held in their US clients' accounts. Some financial institutions are facing challenges in managing the increased reporting, information gathering and compliance requirements across jurisdictions and, in general, the volume and quality of data involved. Regtech solutions can help to reduce the costs associated with granular reporting, and can enhance customer due diligence processes related to the identification of clients' accounts under CRS and FATCA requirements.

- **Tax compliance** with respective rules and ensuring timely and accurate tax payments is an area of increasing regulatory focus. The varying reporting rules for operational taxes, and the rules and process-driven nature of tax compliance and reporting make these areas suited to Regtech solutions. These solutions, powered by underpinning technologies such as cloud, AI and machine learning, can help by automating tax compliance processes which can reduce costs and time spent on manually updating spreadsheets and reports. Effective automation can also help deliver value by freeing up time for the tax function to focus more on value-added strategic and business advisory activities.

Risk management

- **Cyber risk management** refers to risks that can lead to financial loss, disruption or damage to an institution as a result of IT system failures.

The increasing sophistication and scale of cyberattacks has increased the potential consequences of these threats to the banking sector. As banks become increasingly digital, it is important for potential Regtech solutions to protect data, systems and broader business activities from cyber risk. There are Regtech solutions being developed in the area of AI to combat these risks. Behavioural information captured from human touchpoints at various parts of a system or application could be analysed to detect for anomalous activities in a timely manner. For example, a person's typing speed, finger position and finger pressure could be analysed to determine whether an unauthorised person is attempting to hack into a customer's account. As both synthetic and real-world training data sets become more readily available for machine learning, the viability and reliability of these Regtech solutions could increase.

- **Third-party monitoring and risk management (TPRM)** refers to the monitoring of third-party performance and service quality, and managing the risks presented throughout the lifecycle of the relationship. Hong Kong's banking value chain has increased in complexity driven by the rapidly expanding ecosystem of banks, technology and data providers, and other vendors, together with the introduction of virtual banks and an Open API Framework in Hong Kong. Banks are therefore increasingly exposed to third-party risks and will benefit from TPRM-related technologies. These solutions typically collect data from a variety of sources, analyse key indicators to generate risk scores, and provide a portfolio management view of third-party relationships. These tools can improve accuracy and reduce the cost of TPRM activities.

- **Liquidity risk management** involves measuring, monitoring and controlling the liquidity of financial institutions to ensure they have funds to meet obligations. There are platform solutions available that enable financial institutions to manage enterprise assets and liabilities, with functionalities to manage liquidity risk, interest rate risk, funds transfer pricing and regulatory compliance. They allow management to optimise liquidity across business units to meet business objectives while ensuring compliance with regulatory and internal policies. The high degree of data involved in such calculations makes it an attractive area for Regtech.

- **Market risk management** refers to systems and processes that identify, measure, monitor and control exposure and risk of losses arising from movements in market prices (e.g. interest rate risk, credit spread risk, equity risk). The nature of banks' business models means that prudent management of market risk is crucial to their performance and financial soundness. Technology solutions can help banks more efficiently and effectively manage market risk and produce management reports.

- **Credit risk assessment** involves a series of assessments relating to the process of credit underwriting and ongoing monitoring, including the analysis of financial information, verification of documents and review of news related to the borrower. This traditionally requires labour-intensive manual processes that prolong the credit assessment process. Regtech solutions that utilise AI and machine learning seek to overcome these challenges, enabling quicker assessments, greater accuracy and lower costs to the business. For example, in the process of personal loan application, instead of collecting income proof from borrowers, batches of data detailing their relevant attributes can be used to train Supervised Machine Learning models to estimate income and inform credit underwriting decisions. In the area of corporate lending, OCR technology can be used to convert financial statements into a machine-readable format, and the overlay of computational and extraction engines can generate key indicators to facilitate credit analysis.

- **Stress testing** is a technique to assess and analyse a financial institution's potential vulnerabilities (e.g. profitability, liquidity and capital adequacy) to stressed conditions. Its process can be resource-intensive. Technology solutions are often underpinned by an Economic Scenario Generator module that generates values for an array of parameters, simulating potential stress scenarios. This is then applied to the specific financial circumstances of the institution to project its business over a period of time. This equips management with a better understanding of the financial risks faced by the business, and enables them to make informed strategic decisions that balance profitability, liquidity and capital adequacy.

- **Model validation** refers to a financial institution's processes that validate the accuracy and consistency of internal models by parties that are suitably qualified and experienced, and independent of the business functions involved in the development and usage of the internal models. For banks, model validation typically applies to models that relate to credit risk, market risk, liquidity risk and capital management. However, the scope of model validation is increasing as banks and regulators recognise that models are being used across the business, for example in the investment sales process to assess customers' risk appetite. Model validation solutions typically capture data inputs, followed by a validation process involving a combination of quantitative (e.g. model, variables, back-testing) and qualitative (e.g. data quality, consistency) analysis, and finally generate reports and dashboards for management.

Governance & accountability

- **Governance and accountability** refers to the structure of rules, practices, processes and responsibilities within an organisation. Industry challenges arise where reactive risk identification processes lead to control gaps not being proactively managed, and insufficient data leads to poor visibility of issues. There are opportunities for Regtech solutions to transform traditional governance and accountability frameworks from reactive to proactive. For example, the use of GRC and other data-driven tools and dashboards can help to provide a transparent view of responsibilities and enable enhanced real-time monitoring of activities.
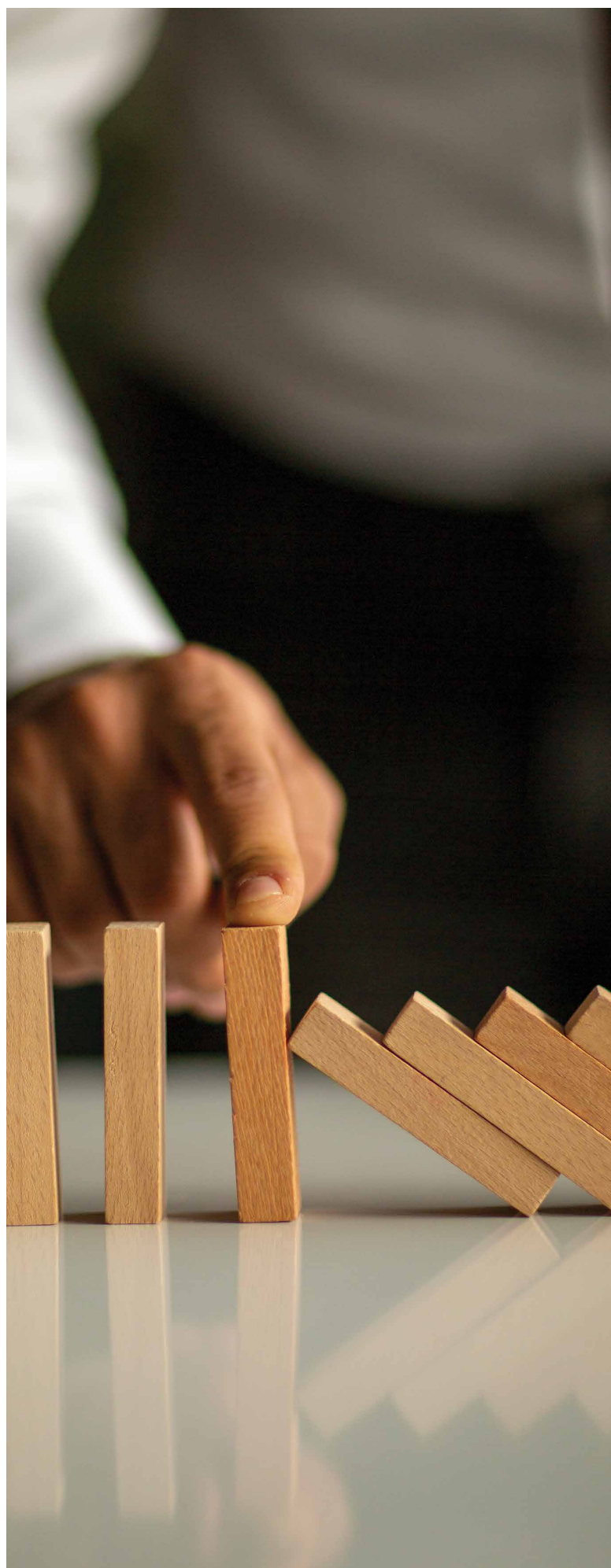
03

Regtech adoption barriers and observations

3.1 Current state of the Regtech industry in Hong Kong

Notable progress in facilitating Regtech adoption has been made in Hong Kong in recent years, and there are significant opportunities to realise the benefits of more widespread Regtech adoption.

A number of developments and initiatives to encourage the development of fintech in Hong Kong in recent years have also helped accelerate the development of Regtech. For example, the establishment of the Fintech Facilitation Office (FFO), the HKMA's Seven Smart Banking initiatives, the Hong Kong SAR Government's R&D tax credits, and the provision of dedicated innovation zones such as Hong Kong Science and Technology Parks and Cyberport, have been key catalysts for fintech and Regtech development.

As a result, Hong Kong is now home to four fintech unicorns^. More specifically, Regtech development in Hong Kong has benefitted from the HKMA's Banking Made Easy initiative as well as the establishment of the FinTech Association of Hong Kong.

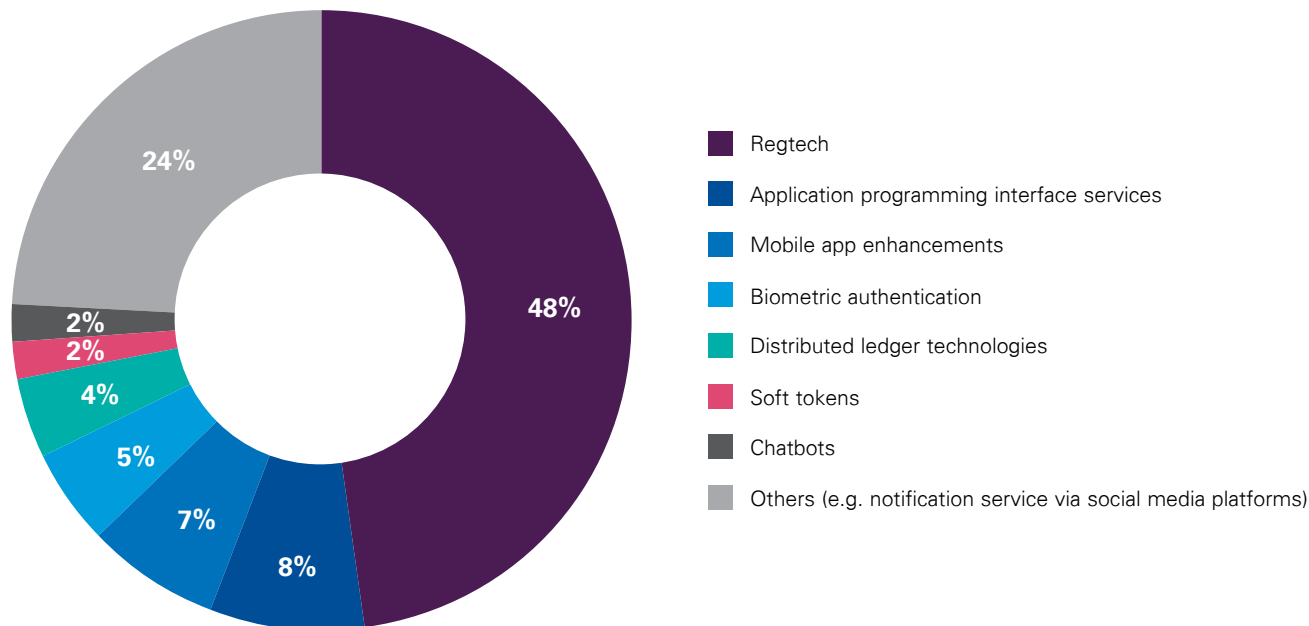## Recent developments driven by the HKMA have been warmly received by banks and Regtech companies

Both banks and Regtech companies have welcomed the HKMA's ongoing initiatives to expand the Regtech ecosystem under the Banking Made Easy initiative and encourage the wider use of Regtech.

Fintech Supervisory Sandbox: Launched by the HKMA in September 2016, the Fintech Supervisory Sandbox (FSS)[10] allows banks and their technology partners to pilot their fintech initiatives to a limited number of participating customers without subjecting them to the full scope of compliance with the HKMA's supervisory requirements.

The FSS was upgraded to FSS 2.0 in 2017 to allow tech companies to access the Sandbox without needing to go through a bank. FSS 2.0 also introduced a single access point for all three financial services sandboxes in Hong Kong (HKMA, Securities and Futures Commission, Insurance Authority), as well as a Fintech Supervisory Chatroom (Chatroom) that provides feedback to banks and tech companies at an early stage of their fintech projects. The HKMA has highlighted that both the FSS and the Chatroom are open to Regtech initiatives and ideas.

As at 31 July 2020, 48% of the 162 pilot trials within the Sandbox and about 22% of all enquiries in the Chatroom were related to Regtech (Figure 5). The HKMA also participates in the cross-jurisdiction piloting of solutions as part of the Global Financial Innovation Network's (GFIN) group of regulators[11].

Figure 5: Distribution of technologies involved in HKMA Fintech Supervisory Sandbox pilot trials (as of 31 July 2020)

- Regtech
- Application programming interface services
- Mobile app enhancements
- Biometric authentication
- Distributed ledger technologies
- Soft tokens
- Chatbots
- Others (e.g. notification service via social media platforms)

Source: HKMA Fintech Supervisory Sandbox

^ Airwallex, BitMex, TNG and WeLab

[10] Fintech Supervisory Sandbox, Hong Kong Monetary Authority, https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech/fintech-supervisory-sandbox-fss/

[11] Next steps of GFIN cross-border testing pilot, Hong Kong Monetary Authority (April 2019), https://www.hkma.gov.hk/eng/news-and-media/press-releases/2019/04/20190430-11/

Regtech Watch: "Regtech Watch"[12] is a newsletter published by the HKMA to promote the adoption of Regtech in the banking industry. It provides information on actual or potential Regtech use cases rolled out or being explored in Hong Kong or elsewhere. The objective is to assist banks in adopting innovative technology to enhance their risk management and regulatory compliance. Four issues of Regtech Watch have been issued since its launch in November 2019, covering cyber risk management, credit risk management, AML/CFT measures and conduct risk management. These newsletters were cited as a welcome development and a useful source of information and guidance by the interviewed banks.

Regtech circulars and events: The HKMA's recent issuance of circulars related to Regtech (e.g. regulatory expectations for remote on-boarding of individual customers[13] and corporate customers[14], and feedback on AML/CFT control measures for remote customer on-boarding initiatives based on thematic reviews[15]) has been well received by many banks. Furthermore, events such as the HKMA AML/CFT RegTech Forum held in November 2019 have generated positive sentiment from the industry and have helped to draw attention to AML/CFT as a key area of Regtech application. One of the primary objectives of the AML/CFT RegTech Forum was to bring together different stakeholders in the AML/CFT ecosystem, including the banking sector and experts in the technology field to increase the collective understanding of industry pain points, what technologies are capable of today, and the challenges that need to be addressed for the successful adoption of such tools. The event also served as an agent to drive change, with the HKMA looking to continue to bring sectors together and identify concrete opportunities for banks to adopt Regtech solutions[16].

Launch of virtual banks: The HKMA's granting of eight virtual bank licences[17] in 2019 is seen as a positive milestone for Regtech adoption. The revised Guideline on Authorization of Virtual Banks was introduced in May 2018 as a key component of the HKMA's Smart Banking initiatives. The amended Guideline supersedes the previous Guideline first issued by the HKMA in May 2000 and its subsequent update in September 2012. The revised Guideline aims to promote the adoption of new technology, enhance customer experience and drive financial inclusion in the city.

The absence of legacy infrastructure and physical branches means that virtual banks can make greater use of new technologies, including Regtech, to offer functionalities such as remote on-boarding. The successful implementation of such technologies has shown traditional financial institutions what can be achieved and has increased industry awareness and interest in Regtech. The successful introduction of virtual banks in Hong Kong is leading to similar initiatives being adopted in other jurisdictions in the region such as Singapore and Malaysia.

Fintech events: The HKMA continues to reach out to and liaise with fintech market players to facilitate the exchange of ideas among stakeholders. It has also organised events in collaboration with the fintech community. By the end of August 2020, it had organised 60 events attracting over 30,000 participants in all. The HKMA has also spoken at fintech-related events and held meetings with other regulatory authorities, industry organisations, financial institutions, technology firms and start-ups. The events, speaking sessions and meetings were well received by the industry.

The FinTech Association of Hong Kong plays a key role in the ecosystem

Established in June 2017, the FinTech Association of Hong Kong aims to champion an open, inclusive and diverse fintech community in Hong Kong. The association seeks to collaborate with all stakeholders in the fintech industry, including working with regulators to promote the adoption of technology and to further develop the ecosystem.

The association has three primary objectives: advocate via a unified voice for the Hong Kong fintech ecosystem, collaborate by bringing together the diverse parts of the community, and educate by learning from existing leaders and nurture the next generation of talent. The association is reported to be one of the most active fintech associations in the world with more than 1,700 members[18], of which more than 200 are corporate members from a diverse range of backgrounds[19].

A Regtech Committee was formed within the association to foster the development of the Regtech ecosystem in Hong Kong. The committee continues to collaborate with other associations and industry stakeholders and

[12] Inaugural Issue of Regtech Watch, Hong Kong Monetary Authority (November 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20191112e1.pdf

[13] Remote on-boarding of individual customers, Hong Kong Monetary Authority (February 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20190201e1.pdf

[14] Remote on-boarding of corporate customers, Hong Kong Monetary Authority (September 2020), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2020/20200924e1.pdf

[15] Feedback from thematic review of AML/CFT control measures for remote customer on-boarding initiatives, Hong Kong Monetary Authority (June 2020), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2020/20200603e1.pdf

[16] HKMA AML/CFT RegTech Forum: Record of Discussion, Hong Kong Monetary Authority (December 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20191223e1a1.pdf

[17] Virtual Banks, Hong Kong Monetary Authority, https://www.hkma.gov.hk/eng/key-functions/banking/banking-regulatory-and-supervisory-regime/virtual-banks/

[18] FinTech Association of Hong Kong Elects New Leadership, Finextra (July 2020), https://www.finextra.com/pressarticle/83315/fintech-association-of-hong-kong-elects-new-leadership

[19] Membership Directory, Fintech Association of Hong Kong, https://ftahk.org/member-directory

has hosted multiple Regtech live events showcasing demonstrations of award-winning Regtech companies. It was ranked as one of the top three committees delivering the most value for their members[20].

In addition, the RegTech Association of Hong Kong, an independent not-for-profit association, was launched in 2019. It was formed by Regtech entrepreneurs to provide a stronger focus on Regtech across all regulated industries with an initial focus on financial services. Its initial focus is on raising awareness of the importance of Regtech. It has around 20 members, principally Regtech companies at present, and is looking to grow and attract financial institutions in the future.

Hong Kong is home to both domestic and international Regtech companies

Hong Kong is currently home to both domestic and international Regtech companies. Interviews for this study found that Hong Kong is currently more of an importer of Regtech solutions, with the majority of active providers headquartered overseas with varying degrees of local operations in Hong Kong. This is not surprising given that foreign bank branches typically follow practices driven by the head office in their home jurisdiction. Surveyed and interviewed banks also cited the maturity of Regtech solutions in jurisdictions such as the US, the UK and Australia as a key reason for deploying them for use in Hong Kong. Efforts to promote Regtech in Hong Kong need to address the needs of both domestic and international Regtech companies.

Regtech companies are positive about opportunities in Hong Kong, but are concerned about the market size and talent supply

Hong Kong is viewed as the top jurisdiction for expansion by surveyed Regtech respondents that do not currently have operations in Hong Kong. Furthermore, interviews suggest that a number of foreign Regtech firms that are currently not operating in Hong Kong would consider entering the market if the right opportunities arise.

Limited market size, cost of talent and a shortage of suitable talent were cited by Regtech firms as key reasons for not operating in Hong Kong. 'Sales and marketing', 'software developers' and 'data scientists' were identified

by surveyed Regtech firms as the top three areas of talent shortage. It is apparent that while a large portion of Regtech firms operating in Hong Kong only deploy client facing staff for sales and account management, some players are also seeking to build solution development teams in Hong Kong but are finding it difficult to find the right talent.

Figure 6: Top 5 countries/ territories where respondents do not currently operate in but expect to be active in five years' time

Ranking	Country/ territory
1st	Hong Kong SAR
2nd	United States
3rd	Mainland China
4th	Singapore
5th	Australia/ United Kingdom

Source: HKMA Regtech Survey for Regtech Companies, KPMG analysis

Current state of Regtech adoption by banks in Hong Kong

32% of survey respondents have fully implemented at least one Regtech solution; greater opportunities for adoption among smaller institutions and foreign bank branches.

Our survey of banks in Hong Kong finds that the level of Regtech adoption varies across the industry (Figure 7). 32% of respondents have fully implemented at least one Regtech solution, while a further 37% are in the process of vendor selection or proof of concept (POC) development. It is perhaps unsurprising that the survey found that the virtual banks are further along their journey with regard to Regtech adoption, as the digital nature of their business models and infrastructure is geared towards Regtech adoption. Private banks and wealth managers are also quite advanced in their Regtech uptake, with 75% using, trialling or selecting Regtech solutions.

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[20] FTAHK2.0 Our Vision for the Future, Fintech Association of Hong Kong (August 2018)
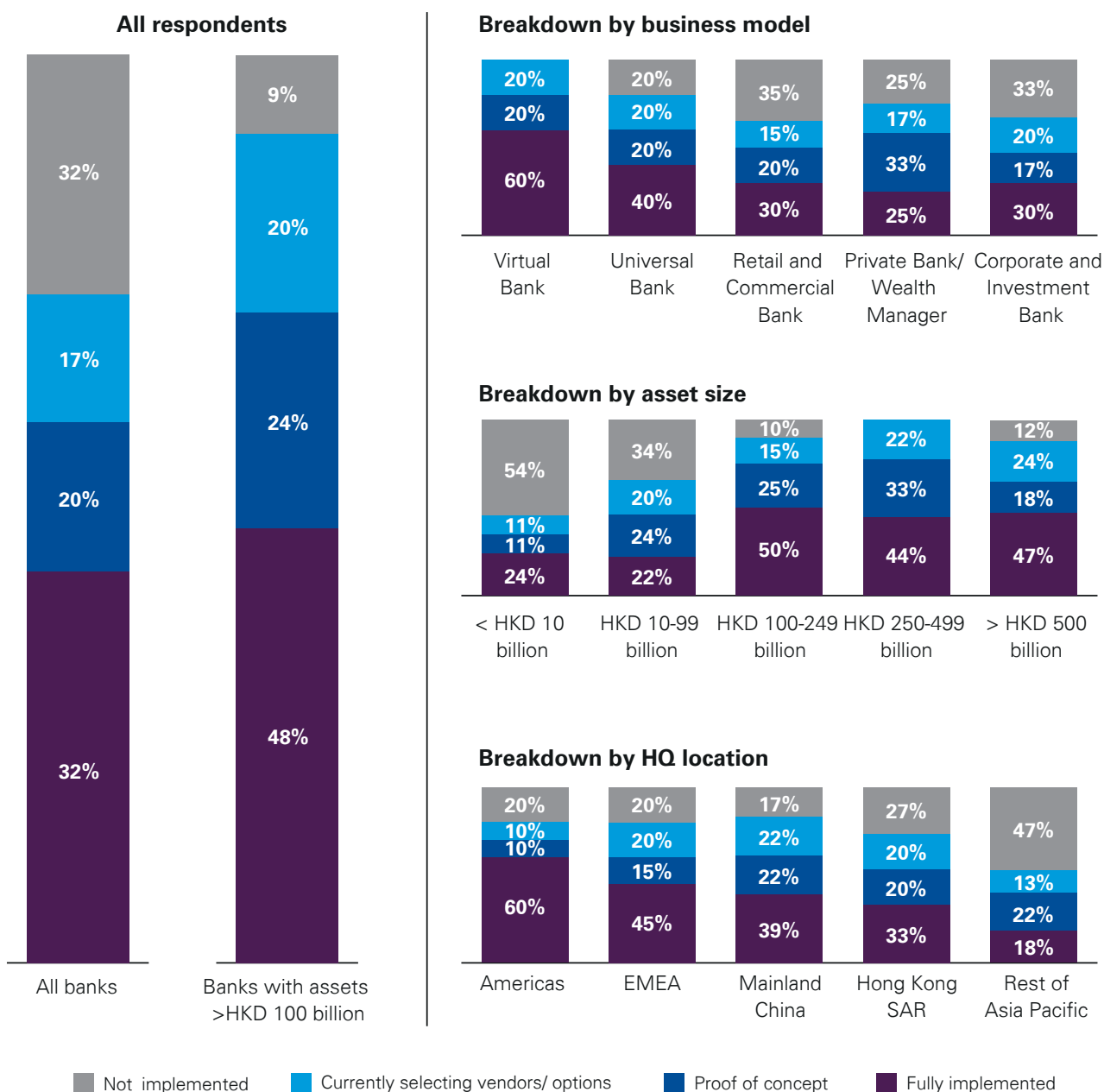
The survey also shows that banks with larger asset sizes are more likely to have fully implemented or are developing POCs for Regtech solutions. For example, 69% of all surveyed banks have either fully implemented solutions, are developing POCs or are selecting vendors/ options, compared to 92% of surveyed banks with assets greater than HKD 100 billion. In addition, respondents that are headquartered in the Americas, EMEA and Mainland China are more advanced in implementing Regtech solutions.

On the other end of the spectrum, 32% of respondents note that they do not currently utilise Regtech solutions. The majority of this group are smaller banks (generally with assets less than HKD 100 billion) and banks that are headquartered in the rest of Asia (excluding Mainland China and Hong Kong). More than half of the surveyed banks with total assets under HKD 10 billion have not yet implemented any Regtech projects.

The findings indicate a clear opportunity to pursue greater Regtech adoption in Hong Kong, not just among the respondents that are yet to utilise or are considering Regtech solutions, but also for those that are at the POC stage. Even for the respondents that have implemented at least one Regtech solution, the 26 application areas outlined in Section 2.4 suggest that there is significant potential for those banks to explore more solutions. The different needs of these groups need to be carefully considered in order to promote wider adoption.

Figure 7: Breakdown of respondents' current state of Regtech implementation in Hong Kong

All respondents

	All banks	Banks with assets >HKD 100 billion
Not implemented	32%	9%
Currently selecting vendors/ options	17%	20%
Proof of concept	20%	24%
Fully implemented	32%	48%

Breakdown by business model

	Virtual Bank	Universal Bank	Retail and Commercial Bank	Private Bank/ Wealth Manager	Corporate and Investment Bank
Not implemented		20%	35%	25%	33%
Currently selecting vendors/ options	20%	20%	15%	17%	20%
Proof of concept	20%	20%	20%	33%	17%
Fully implemented	60%	40%	30%	25%	30%

Breakdown by asset size

	< HKD 10 billion	HKD 10-99 billion	HKD 100-249 billion	HKD 250-499 billion	> HKD 500 billion
Not implemented	54%	34%	10%		12%
Currently selecting vendors/ options	11%	20%	15%	22%	24%
Proof of concept	11%	24%	25%	33%	18%
Fully implemented	24%	22%	50%	44%	47%

Breakdown by HQ location

	Americas	EMEA	Mainland China	Hong Kong SAR	Rest of Asia Pacific
Not implemented	20%	20%	17%	27%	47%
Currently selecting vendors/ options	10%	20%	22%	20%	13%
Proof of concept	10%	15%	22%	20%	22%
Fully implemented	60%	45%	39%	33%	18%

Legend: ▇ Not implemented ▇ Currently selecting vendors/ options ▇ Proof of concept ▇ Fully implemented

Note: Numbers may not add up to 100% due to rounding
Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

Use case maturity in Hong Kong

Financial crime-related use cases are those with the most mature solutions in Hong Kong, while opportunities exist for new solutions in more emerging areas.

Our survey of banks indicates a wide range of Regtech use cases within the banking industry in Hong Kong, with at least one respondent currently using a Regtech solution in each of the 26 identified use cases in the survey. However, the maturity of solutions and attitudes and awareness vary significantly across use cases.

Financial crime-related solutions are considered the most mature

Financial crime compliance and KYC solutions are viewed as the most mature, with a large portion of surveyed banks currently using or implementing Regtech in these areas (Figure 8). These include name screening (62% of banks), AML transaction monitoring (54% of banks), customer on-boarding (including KYC/ background checks, 47% of banks) and ongoing monitoring of customer activity (37% of banks). This is understandable given the significant regulatory focus and volume of activities driven by regulators in Hong Kong and other jurisdictions in the past few years.

The next group of common existing application areas relates to regulatory reporting (32% of banks) and other risk management areas, including credit risk (32% of banks), market risk (30% of banks), cyber risk (28% of banks) and liquidity risk (27% of banks). Banks with varying asset sizes, and presumably resources, have different adoption maturity in these areas. Larger banks are generally more mature with regard to Regtech adoption, while smaller banks tend to view regulatory reporting and risk management as areas to adopt Regtech solutions in the future.

Other emerging areas where there are fewer use cases but significant interest in future adoption include GRC tools (helps maintain and manage a repository of regulations to ensure compliance requirements are met), TPRM, stress testing for capital management and conduct-related areas (for example, sales practices, product suitability and disclosures). The smaller banks surveyed tend to consider Regtech for fulfilling compliance requirements, while the larger banks are focusing on product-related matters (e.g. product disclosure).

Some solutions need to mature further for the Hong Kong environment

Although there is significant demand for solutions across a range of areas, the survey indicates that relevant existing solutions in Hong Kong will need to become more mature before there can be greater adoption. The top three areas where solutions were not considered mature enough include operational resilience from regulatory change, regulatory horizon scanning and product due diligence. Although in many cases the solutions are not mature enough globally, this suggests areas where greater efforts are needed to promote solution development.
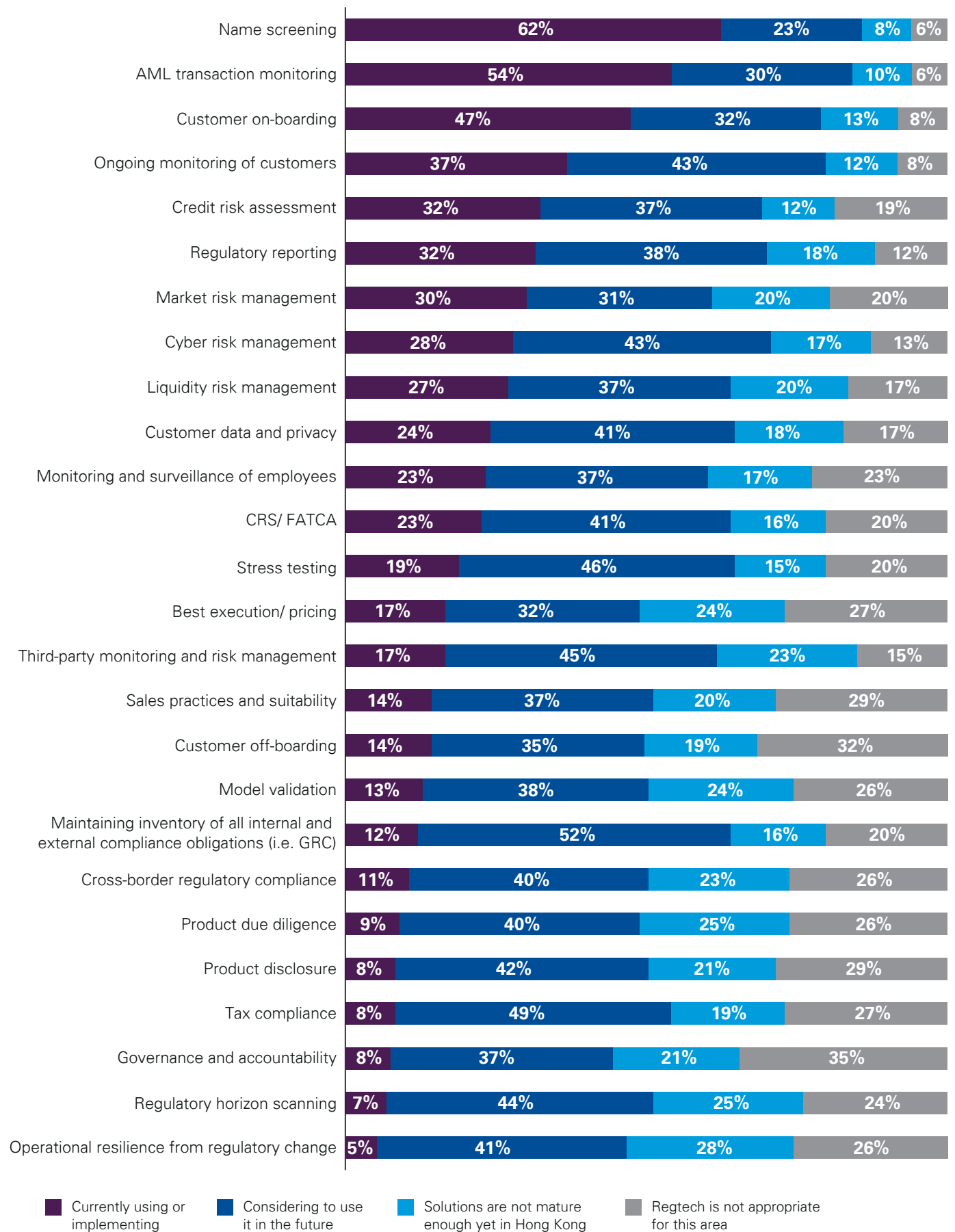
Some solutions are specific to certain business models

Other emerging areas are more localised to specific segments of the industry. For example, banks operating in the private wealth management industry place a high priority on sales practices and product suitability, with 75% of surveyed respondents either already using or considering adopting Regtech solutions. Segmenting the industry by total asset size also reveals that larger banks tend to prioritise product disclosure quite highly as compared to smaller banks, with half of the surveyed large banks (total assets greater than HKD 250 billion) citing this as an area being considered for future Regtech adoption. This is partly attributable to their more retail and private bank focus. Within the virtual bank segment, there is more active adoption of Regtech. All surveyed virtual banks are either already using or in the process of implementing Regtech for on-boarding. 80% of respondents are using or implementing Regtech for AML transaction monitoring, ongoing monitoring of customers and name screening.

'Not suitable' responses indicate a lack of need or awareness

20% of survey respondents felt that Regtech was not appropriate across the application areas. This may be indicative of the specific scale and business model of the institution. For example, 37% of surveyed banks with total assets less than HKD 10 billion did not see cross-border regulatory compliance as an appropriate area for Regtech. Alternatively, this may indicate a lack of awareness of solutions because, as evidenced by the respondents that have implemented Regtech solutions, there are genuine use cases across all categories.

Figure 8: Respondents' current usage/ views on technology used in complying with banking regulations and risk management standards in Hong Kong

	Currently using or implementing	Considering to use it in the future	Solutions are not mature enough yet in Hong Kong	Regtech is not appropriate for this area
Name screening	62%	23%	8%	6%
AML transaction monitoring	54%	30%	10%	6%
Customer on-boarding	47%	32%	13%	8%
Ongoing monitoring of customers	37%	43%	12%	8%
Credit risk assessment	32%	37%	12%	19%
Regulatory reporting	32%	38%	18%	12%
Market risk management	30%	31%	20%	20%
Cyber risk management	28%	43%	17%	13%
Liquidity risk management	27%	37%	20%	17%
Customer data and privacy	24%	41%	18%	17%
Monitoring and surveillance of employees	23%	37%	17%	23%
CRS/ FATCA	23%	41%	16%	20%
Stress testing	19%	46%	15%	20%
Best execution/ pricing	17%	32%	24%	27%
Third-party monitoring and risk management	17%	45%	23%	15%
Sales practices and suitability	14%	37%	20%	29%
Customer off-boarding	14%	35%	19%	32%
Model validation	13%	38%	24%	26%
Maintaining inventory of all internal and external compliance obligations (i.e. GRC)	12%	52%	16%	20%
Cross-border regulatory compliance	11%	40%	23%	26%
Product due diligence	9%	40%	25%	26%
Product disclosure	8%	42%	21%	29%
Tax compliance	8%	49%	19%	27%
Governance and accountability	8%	37%	21%	35%
Regulatory horizon scanning	7%	44%	25%	24%
Operational resilience from regulatory change	5%	41%	28%	26%

Legend:
- Currently using or implementing
- Considering to use it in the future
- Solutions are not mature enough yet in Hong Kong
- Regtech is not appropriate for this area

Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

Use cases can be prioritised based on maturity

The use cases can be categorised according to three broad categories (Figure 9):

- **Ready now:** This includes solutions such as name screening, AML transaction monitoring and customer on-boarding. Depending on business needs, it can be a 'no regrets' decision for banks to implement and execute with proven solutions and case studies.

- **Prepare to implement:** These are solutions that may have been viewed by respondents as less mature than

those in the first category, but are worthy of serious effort and consideration to implement. It includes maintaining inventory of all internal and external compliance obligations (e.g. GRC), TPRM and tax compliance.

- **Monitoring and POCs:** This represents the solutions that need more work to enhance the technology or further localise for Hong Kong, and includes operational resilience from regulatory change, regulatory horizon scanning and product due diligence. This should be a priority for more innovative institutions and market leaders.

Figure 9: Prioritisation of risk and compliance application areas

	Ready Now	Prepare to implement	Monitoring and POCs
Regulatory Compliance Obligations		Maintaining inventory of all internal and external compliance obligations (i.e. GRC)	Cross-border regulatory compliance
			Regulatory horizon scanning
			Operational resilience from regulatory change
Financial Crime	Customer on-boarding		Customer off-boarding
	Name screening		
	AML transaction monitoring		
	Ongoing monitoring of customers		
Conduct & Customer Protection		Sales practices and suitability	Product due diligence
		Product disclosure	Best execution/ pricing
		Customer data and privacy	
		Monitoring and surveillance of employees	
Regulatory & Tax Reporting	Regulatory reporting	Tax compliance	
	CRS/ FATCA		
Risk Management	Cyber risk management	Third-party monitoring and risk management	Model validation
	Liquidity risk management	Stress testing	
	Market risk management		
	Credit risk assessment		
Governance & Accountability			Governance and accountability

Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

3.2 Regtech adoption challenges

Budgetary and capability constraints, as well as the lack of availability and maturity of solutions are the main adoption challenges for banks and Regtech providers.

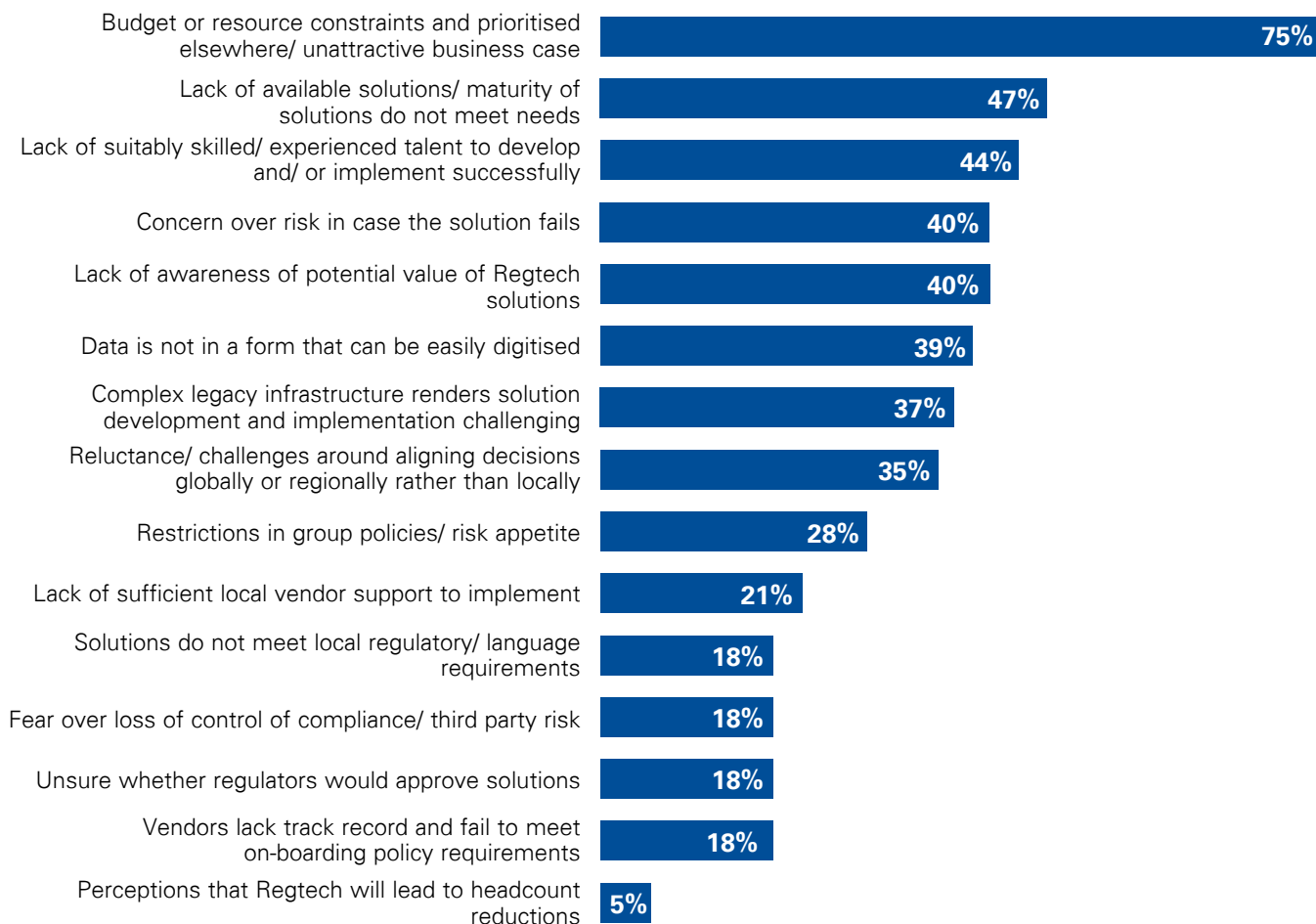## 'Budget and resourcing constraints' is the primary barrier

'Budget and resourcing constraints or unattractive business case' was highlighted by 75% of surveyed banks as a 'top five' barrier to Regtech adoption, with banks often allocating resources elsewhere (Figure 10). Revenue generating drivers that contribute to both top and bottom-line growth are typically viewed as a higher priority than initiatives where the potential benefits are perceived as more conceptual and difficult to quantify. Furthermore, it can be challenging to fit what can be perceived as discretionary spend into annual budgetary cycles.

As a result, it is observed that funding for technology solutions related to risk management and compliance activities is often not a priority.

This trend is more evident among the smaller banks. Our survey finds that there is an inverse relationship between the percentage of banks that ranked budget and resourcing constraints as their top adoption challenge, and their total assets. Banks with assets greater than HKD 500 billion are the exception, as they often have to manage a number of competing priorities that are associated with a large and more diversified financial institution. Interviews with banks found that even within the Regtech domain itself, there are often competing priorities across different divisions and functions.

The current business environment has made cost management a primary area of focus for the industry. There are opportunities for banks to adopt Regtech solutions to help reduce costs related to their risk management and compliance activities.

Figure 10: Barriers to adopting Regtech solutions that banks ranked as a top 5 challenge

Barrier	Percentage
Budget or resource constraints and prioritised elsewhere/ unattractive business case	75%
Lack of available solutions/ maturity of solutions do not meet needs	47%
Lack of suitably skilled/ experienced talent to develop and/ or implement successfully	44%
Concern over risk in case the solution fails	40%
Lack of awareness of potential value of Regtech solutions	40%
Data is not in a form that can be easily digitised	39%
Complex legacy infrastructure renders solution development and implementation challenging	37%
Reluctance/ challenges around aligning decisions globally or regionally rather than locally	35%
Restrictions in group policies/ risk appetite	28%
Lack of sufficient local vendor support to implement	21%
Solutions do not meet local regulatory/ language requirements	18%
Fear over loss of control of compliance/ third party risk	18%
Unsure whether regulators would approve solutions	18%
Vendors lack track record and fail to meet on-boarding policy requirements	18%
Perceptions that Regtech will lead to headcount reductions	5%

Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

Lack of availability and maturity of solutions a significant obstacle

47% of surveyed banks noted that a lack of available and mature solutions in Hong Kong remains a key challenge to Regtech adoption, the second ranked barrier overall. Importantly, this finding indicates that while some banks may be facing budgetary and resource constraints, there is certainly interest in exploring and investing in Regtech solutions if they are fit for purpose. 74% of the surveyed banks expressed an open attitude towards the future adoption of Regtech solutions, citing that Regtech will play an important role in the industry and can bring benefits such as improved efficiency, a reduction in manual processes and enhanced internal controls and risk management.

Interviews with banks found that a common issue arises when Regtech firms approach banks with a solution before assessing or understanding the actual pain points that the banks are facing. For example, some Regtech solutions did not adequately address local regulatory requirements, while others were not suitable for the bank's specific business or operational circumstances and setup. This may reflect the fact that some Regtech providers present in Hong Kong offer global solutions that may not have tailored solutions to meet the needs of the Hong Kong regulatory environment.

Talent shortages are hindering Regtech development

'Lack of suitably skilled/ experienced talent to develop and/ or implement successfully' is highlighted by 44% of surveyed banks as a key barrier to Regtech adoption. Several interviewed banks noted that they aim to recruit talent with skill sets from multiple disciplines (e.g. regulatory compliance, technical programming/ data analytics and business domain) and highlighted the importance of experience in the field. This barrier is more commonly cited by locally incorporated banks, as they tend to source their talent from the local market. The survey and interview findings therefore indicate that while Regtech solutions need to further mature, suitable talent also needs to be nurtured to facilitate greater Regtech adoption in Hong Kong.

Concerns remain about the associated risks if a solution fails

40% of surveyed banks ranked 'concern over risk in case the solutions fails' as one of their top five barriers to adopting Regtech. As Regtech is still a relatively new

area of exploration, several banks continue to follow a more cautious approach to localised adoption and are closely monitoring the adoption strategies of their peers. Interviews with banks revealed that greater awareness of successful cases and guidance would help to overcome this barrier.

This barrier is particularly evident among smaller banks (asset size of less than HKD 100 billion). However, some interviewed Regtech providers noted that it is often easier to market their solutions to smaller banks due to the relative ease in adopting Regtech as compared to larger banks that may have more complex infrastructure and processes.

Lack of awareness of potential benefits

40% of surveyed banks noted that a lack of awareness or potential value of Regtech solutions was another key barrier to Regtech adoption. This indicates that banks are interested in harnessing suitable Regtech solutions, but more needs to be done to communicate the available solutions in the market and the potential benefits they can bring.

Specifically, a few interviewed banks cited that Board members and senior management, as well as middle management, are often blockers for Regtech solutions as they do not fully understand the potential benefits. Given the increased focus on cost management, there is a need to place greater emphasis on communicating the cost benefits of Regtech solutions.

Other commonly cited Regtech adoption challenges vary depending on the bank's size and place of incorporation

Larger banks face significant challenges around data readiness and legacy infrastructure. For some financial institutions, the practice of bolting on new platforms or system upgrades without addressing legacy issues has created a complex network of systems and data architecture. This can require a significant amount of time and resources to address before certain Regtech solutions can be fully and effectively implemented.

Meanwhile, the survey finds that smaller banks are grappling with a lack of awareness of Regtech solutions and their benefits, as well as talent shortages. It is therefore essential to increase awareness among different groups within financial institutions, including senior management, risk and compliance, IT and business unit management.

Many locally incorporated banks also cited the lack of suitable talent as a key adoption challenge. The shortage of talent, particularly around business domain knowledge, working knowledge of regulatory requirements and technology domain knowledge and skills, also needs to be addressed. This applies to both local and international talent.

In addition, interviews with banks incorporated overseas (or foreign branches) found that obtaining alignment and approval from the head office for locally initiated Regtech initiatives remains a challenge. Since many international financial institutions follow a centralised model for their strategic technology initiatives, selection and deployment of Regtech solutions tend to be driven globally from the head office. This means that foreign branches in Hong Kong often have limited input or involvement in the analysis, evaluation and selection of Regtech solutions prior to their implementation locally. Interviewees highlighted several localisation issues that can therefore surface during implementation, such as regulatory incompatibility and unsupported languages or dialects.

Regtech providers' prioritisation was broadly similar to that of banks

Banks and Regtech providers agree that budgetary concerns are the number one constraint (Figure 11), with similar positioning for lack of awareness of potential value (5th for banks and 2nd for Regtech providers respectively), data not being in a form that can be easily digitised (6th and 6th respectively), and banks' restrictions in group policies/ risk appetite (9th and 8th respectively).

Figure 11: Relative ranking^ of Regtech adoption barriers by type of respondent

Barriers to Regtech adoption	Banks	Regtech Providers*
Budget or resource constraints are prioritised elsewhere/ unattractive business case (e.g. not enough scale)	1st	1st
Lack of available solutions/ maturity of solutions do not meet needs	2nd	9th
Lack of suitably skilled/ experienced talent to develop and/ or implement successfully	3rd	10th
Concern over risk in case the solution fails (e.g. financial cost, compliance breach, reputation)	4th	7th
Lack of awareness of potential value of Regtech solutions (e.g. ambiguous business case)	5th	2nd
Data is not in a form that can be easily digitised and used in Regtech solutions	6th	6th
Complex legacy infrastructure renders solution development and implementation challenging	7th	3rd
Reluctance/ challenges around aligning decisions globally or regionally rather than locally	8th	4th
Restrictions in group policies/ risk appetite (e.g. data, security)	9th	8th
Lack of sufficient local vendor support for implementation	10th	14th
Solutions do not meet local regulatory/ language requirements	11th	15th
Fear over loss of control of compliance/ third-party risk	12th	12th
Unsure whether regulators would approve solutions	13th	5th
Vendors lack track record and fail to meet on-boarding policy requirements	14th	13th
Perception that Regtech will lead to headcount reductions	15th	11th

^Ranking based on the sum of respondents who have ranked options as top 5
*Ranking by Regtech providers is based on barriers cited by their clients/ potential clients

There was also similar positioning for lower-ranked barriers across both groups of respondents, such as banks' fear of headcount reduction.

Indications that Regtech providers need to focus more on pain points, localisation and vendor support

Bank respondents view the lack of available or mature solutions as the second most important barrier to adoption, compared to ninth for Regtech providers. This was supported by interviews with banks that suggested technology firms often approach banks with a Regtech solution without a complete understanding of the actual pain points that they face. On the other hand, interviewed Regtech providers noted that a key challenge to Regtech adoption relates to difficulties in gaining traction with banks in Hong Kong due to the latter's preference for more mature solutions and an established track record. There is a similar, yet less prominent, divergence between the degree of localisation to local language and regulatory requirements (banks rank 11th and Regtech providers 15th) and level of local vendor support (10th and 14th respectively). This difference suggests the need for Regtech providers to focus more on these areas in order to drive greater Regtech adoption.

Regulatory concerns feature more prominently for Regtech providers

Regtech providers cite greater concern than banks over whether regulators would approve solutions. This could partly reflect the international nature of the respondent group or reasons given by banks for not pursuing conversations further. Although regulators will not endorse specific solutions, greater engagement leveraging the active use of the FSS and the Chatroom may provide Regtech providers with early supervisory feedback and more confidence in rolling out new initiatives.

3.3 Lessons from other markets

Other markets are showing momentum in Regtech adoption as they adopted early, follow integrated approaches and provide financial incentives.

As part of this white paper, three jurisdictions were approached for better understanding of the progress made and lessons learnt in promoting Regtech adoption.

Australia

Australia benefits from a strong and independent Regtech association as well as clear guidance from the regulator on which use cases to prioritise and adopt. Coordinating with other Australian financial services regulators, the Australian Securities and Investments Commission (ASIC) has taken a leading role in driving Regtech development and adoption within the sector. ASIC pursues the promotion of Regtech adoption as a key strategic priority via its Innovation Hub by engaging with the Regtech industry on policies and perspectives, and promoting Australia as a world-class Regtech developer and adopter[21].

ASIC received federal government funding for financial years (FY) 2018-19 and 2019-20 to promote Australia as a world leader in developing and adopting Regtech solutions for risk management and compliance problems relating to financial services[22]. Building on its existing engagement and collaboration approach to promoting the potential benefits of Regtech to financial institutions, the funding was used to develop a series of Regtech initiatives. Focusing on the most challenging and impactful regulatory issues, the "ASIC Regtech Initiative Series" examines the potential of Regtech solutions that are in the developmental phase rather than mature services.

The four initiatives set out in the FY2018-19 series included 'Monitoring financial promotions', 'Financial advice files', 'Voice analytics and voice-to-text' and 'Technology-Assisted Guidance (TAG) tool'[23]. These topic areas were chosen after consultations with stakeholder groups highlighted the potential for Regtech to deliver better monitoring and compliance outcomes for a fairer and stronger market for consumers.

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[21] Innovation Hub, Australian Securities and Investments Commission (2020), https://asic.gov.au/for-business/innovation-hub/
[22] ASIC and Regtech, Australian Securities and Investments Commission, https://asic.gov.au/for-business/innovation-hub/asic-and-regtech/
[23] ASIC regtech initiative series 2018-19, Australian Securities and Investments Commission (2019), https://asic.gov.au/for-business/innovation-hub/asic-and-regtech/asic-regtech-initiative-series-2018-19/

An event was organised for each initiative, with specific problem statements for which Regtech solution providers were selected to demonstrate their solutions on curated data sets.

This communication approach of clearly setting out initiatives with specific focus areas for the coming 12 to 18 months allowed the industry to prepare and allocate funding and resources to the relevant areas with greater confidence.

The RegTech Association[24] is a non-profit association founded in March 2017 to support the growth and deployment of Regtech. With a membership base of over 120 local and international Regtech and corporate organisations, the association brings together regulators, regulated entities, Regtech providers and professional services firms to tackle industry issues, and promotes the adoption of Regtech via a series of events that involve guest speakers and presentations from Regtech firms. The association also hosts an annual RegTech Awards[25] with a diverse panel of 18 judges from banks, Regtech providers and government bodies.

In its first few years of operation, the association has helped to foster greater collaboration and communication across the industry, including through relevant Regtech thought leadership, news, events and awards. This approach differs from Regtech associations in other jurisdictions in terms of its significant membership size and level of collaboration with regulators as a standalone Regtech association.

Singapore

The Singapore government and the Monetary Authority of Singapore (MAS) are actively collaborating with the industry to promote the use of Regtech solutions in Singapore.

Data availability is the foundation for the ecosystem. In this regard, the government has taken the lead in allowing Regtech firms to access certain data sets to use in their solutions. This is the "Government-as-a-Service" model via the Smart Nation Initiative[26], where a single data strategy unifies data sources across government agencies through the MyInfo service. This has allowed greater and more efficient access and use of trusted data by businesses, including financial institutions, and has enabled initiatives

such as SingPass Mobile[27], a digital identity management system, to be used to open personal banking accounts. This helps banks to meet KYC requirements in an efficient, seamless and secure manner.

The ecosystem is further enhanced by key partners including the Singapore FinTech Association (SFA). It has established a RegTech sub-committee with objectives that include: talent development; engagement with regulators; engagement with industry; and nurturing the development of both local and international Regtech companies.

MAS and the SFA also collaborate to drive technology initiatives across the financial services sector. A number of interviewees suggested that MAS's visible involvement in the Regtech and broader fintech industry has helped to send a message to the financial services sector that embracing technology is a priority. This close collaboration has helped to enable rapid responses such as the establishment of the SGD 6 million MAS-SFA-AMTD FinTech Solidarity Grant to support Singapore-based fintech companies amid the challenging business climate caused by the COVID-19 pandemic[28]. The FinTech Compliance Readiness Framework and Self-Assessment Toolkit was also launched to enhance the compliance readiness of fintech solutions, and promote a safe and sustainable partnership between financial institutions and fintechs in Singapore.

As a strong advocate of thought leadership in the Regtech domain, MAS and the Financial Stability Board (FSB) supported the Saudi G20 Presidency and the Bank for International Settlements (BIS) Innovation Hub Singapore Centre in conducting the inaugural G20 Global TechSprint in 2020 to examine the potential for new and innovative technologies to respond to operational challenges in the areas of Suptech (supervisory technology) and Regtech.

MAS and the SFA also have a variety of funding schemes to accelerate technology adoption in the financial services sector. There are nine grants that target fintech solution development, adoption or establishment of a technology innovation hub in Singapore. Financial institutions and fintech firms in Singapore have tapped into these grants to implement Regtech projects.

[24] The RegTech Association, https://www.regtech.org.au/
[25] RegTech Awards 2020, The RegTech Association (2020), https://www.regtech.org.au/rta-awards-2020
[26] Initiatives, Smart Nation Singapore, https://www.smartnation.gov.sg/what-is-smart-nation/initiatives
[27] Singapore Personal Access, https://www.singpass.gov.sg/singpass/common/aboutus
[28] MAS-SFA-AMTD Fintech Solidarity Grant, Singapore Fintech Association (2020), https://singaporefintech.org/mas-sfa-amtd/

Finally, MAS organises high-profile fintech events including the annual Singapore FinTech Festival (SFF)[29] and the MAS Global FinTech Innovation Challenge. The latter comprises two distinct competitions – the MAS Global FinTech Hackcelerator[30] and the MAS FinTech Awards[31] with a total cash prize of SGD 1.75 million and 15 awards being handed out each year that range from SGD 50,000 to SGD 150,000.

UK

The Financial Conduct Authority (FCA) was an early supporter of Regtech. It has promoted the development of the Regtech ecosystem through a variety of initiatives that communicate with the Regtech industry, advocate greater Regtech adoption and facilitate opportunities for the private sector to convene and overcome challenges.

The FCA was a pioneer in the creation of a regulatory sandbox[32] in May 2016. Its sandbox has received over 440 applications, and approximately 140 businesses across six cohorts have participated in testing their propositions. The FCA also chairs GFIN, and in 2019 led the launch of a global sandbox. The cross-border testing pilot allowed firms the opportunity to test their solutions with up to 17 participating regulators, although most applicants only selected a few regulators to test with, as aligned with their respective business strategies. The pilot cohort saw 44 applicants, most of which were in the earlier stages of development and smaller in scale. Eight were selected to proceed, of which three were selected to be tested with the HKMA.

The FCA was also the first regulator to host a hackathon-style event that focused on Regtech in 2016, called TechSprint[33]. It follows a now familiar format where the industry is invited to enter project teams to develop technology solutions for specified problem statements in a set period of time, ranging from two days to two weeks. These events also often feature keynote speeches, discussion panels and networking sessions, drawing in a wide audience.

The first TechSprint event focused on consumer access and involved 40 participants from 10 organisations. The FCA has since hosted seven TechSprint events spanning a variety of focus areas including financial services products to help consumers in vulnerable circumstances, such as those with mental health problems, model-driven machine executable regulatory reporting, AML and financial crime, and pensions. The scale of these events has varied depending on the topic, ranging from niche events with 30 individual participants, to global events with 140 participants from 40 organisations.

The FCA recognises the difficulty in demonstrating the value of solutions and building convincing business cases in the absence of data. To help overcome this barrier, the FCA has launched a digital sandbox with a focus on providing synthetic data sets to enable the development of new solutions to challenges exacerbated by the COVID-19 pandemic. It is expected to act as a public utility for a range of stakeholders, including incumbents, Regtech firms, technology providers, academics and regulators, to test technology solutions.

The survey results, research findings and interview insights throughout this section – relating to the current state of the Regtech industry in Hong Kong, adoption challenges and lessons learnt from other markets – form a basis for the 16 recommendations that are further explored in Section 5.

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[29] Singapore Fintech Festival, https://www.fintechfestival.sg/

[30] Global Fintech Hackcelerator, Singapore Fintech Festival (2020), https://www.fintechfestival.sg/global-fintech-hackcelerator

[31] MAS Fintech Awards, Singapore Fintech Festival (2020), https://www.fintechfestival.sg/fintech-awards

[32] Regulatory Sandbox, Financial Conduct Authority (July 2020), https://www.fca.org.uk/firms/innovation/regulatory-sandbox

[33] TechSprints, Financial Conduct Authority (March 2020), https://www.fca.org.uk/firms/innovation/regtech/techsprints

|04

Regtech implementation common practice

4.1 Conceptual framework

The potential uses of Regtech and its benefits presented in Section 2 show ample opportunities for all banks, but the array of adoption barriers discussed in Section 3 highlights some of the challenges that need to be overcome. A five-stage Regtech adoption process that helps banks navigate this journey could be considered: Identify, Create, Validate, Develop and Deploy (Figure 12). Each step builds on the last and the framework makes use of Design Thinking and Agile to bring in skills from across the organisation and develop robust solutions rapidly.

Regtech providers can play a key role in implementation. This section also discusses key considerations for using external providers and five attributes of an effective partnership.

Laying the foundations

There are three key components that form the foundation of the framework.

1   **Ownership:** Clear ownership is needed over the implementation of Regtech. Surveyed banks most commonly cited the CEO as the key sponsor of Regtech solutions (Figure 13). This is understandable as the CEO has authority and a cross-functional purview. However, when implementing a solution, the composition of the Steering Committee at a bank needs to be carefully considered to ensure that there is appropriate and balanced representation from all impacted functions.

2   **Governance:** The above shows the importance of having appropriate governance to ensure that projects

Figure 12: Regtech adoption process

IDENTIFY opportunities

CREATE potential concepts

VALIDATE concepts

DEVELOP working solutions

DEPLOY to realise value

Design thinking approach bringing in skills from across the Firm and Ecosystem to address opportunities
The Agile approach brings speed to the market and more robust solutions.

Source: KPMG

stay on track as they progress through each stage. Banks can build this into their existing project governance structures or use the above process as an example.

3 **Capabilities:** It is important to ensure that the bank has hired or developed the right technical capabilities in order to implement effectively. This is important regardless of whether the solution is developed in-house or sourced externally.

Identify opportunities

The first stage begins with identifying opportunities from across the institution. This involves identifying regulatory, risk and compliance pain points and improvement areas, and defining a problem statement. These can then be prioritised based on factors such as the current strategic focus of the organisation (growth, cost or risk mitigation), initial views of the scale of the benefit and the cost and maturity of the available solutions. Benefits can be challenging to measure, but conducting a high-level comparative analysis to directionally differentiate between opportunities is sufficient at this stage. For example, benefits can be identified, mapped and assessed based on whether they are financial or non-financial, and whether they are quantifiable or non-quantifiable.

Create potential concepts

The next stage is to create potential concepts, which may involve external technology providers. To assist with the sourcing of external providers, there are solutions in the market that provide matching services based on defined problem statements.

Figure 13: Primary sponsor of Regtech solution implementation at surveyed banks

Chief Executive Officer	39%
Business Unit Head	14%
Chief Compliance Officer	13%
Chief Technology Officer	8%
Head Office	8%
Chief Operating Officer	6%
Chief Risk Officer	4%
Depends on area	4%
Head of Innovation	2%
Management Committee	2%
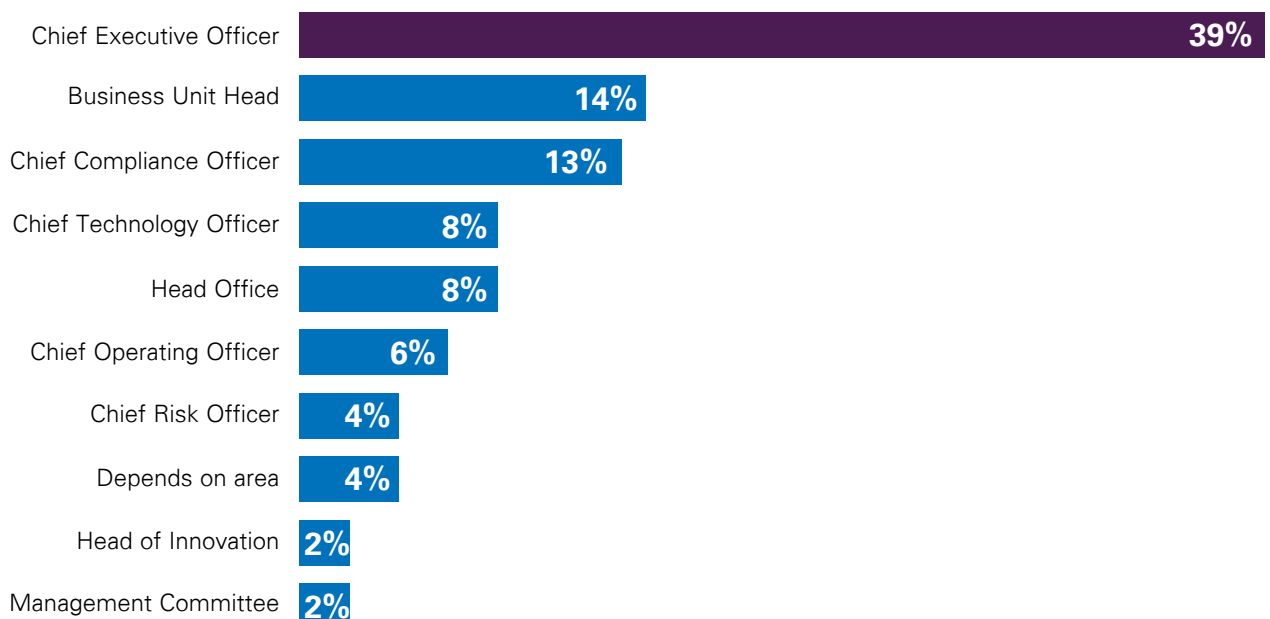
Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

The key here is to develop high-level designs and resourcing estimates for development, testing and launch in order to provide input into high-level business cases. This allows for an initial assessment of feasibility and prioritisation before continuing to the next stage.

Validate concepts

Among the high-level business cases, the higher priority concepts can be progressed to the next stage of developing POCs. This can involve building a limited functionality mock-up to determine whether the concept will work as envisioned. This should give a clearer view of the benefits, costs and implementation requirements of the solution and enable a more detailed business case. Once the concept has been validated and an implementation plan has been laid out, it is time for senior management to give the green light.

Validation should also look at the challenges before developing solutions. This should include a realistic assessment of implementation challenges and how to overcome them. The survey highlights that data being in the wrong format or policy restrictions are major challenges. Unless these problems are well understood with clear solutions, then significant time could be wasted in the development phase.

Develop working solutions

To develop workable solutions, banks could consider an Agile and well governed development approach. If developing a solution internally, this stage involves putting together a full implementation team, made up of a balance of business and technology professionals. This can benefit from an Agile methodology, comprising a series of incremental time-boxed sprints. Functional testing should be built into relevant sprints at the appropriate stages of development, while User-Acceptance-Testing should be carried out in the final sprints towards the end of the development process. If using a third-party vendor, the focus is around customising an existing solution to the organisation. It is equally important to ensure that the vendor has sufficient support from both business and IT to be able to ensure needs are met. It is also important to build a robust testing framework into this phase.

Deploy to realise value

Deployment is the most critical activity in realising the benefits of a solution. However, development tends to take up a significant portion of time and resources and can lead to deployment getting neglected. When technology projects go over time and budget, it is usually the deployment phase that gets contracted in order to make up for lost time or investment. It is critical to have an appropriate change management strategy in place and to ensure that end users have sufficient guidance and training to be able to realise the end benefits. Successful deployment requires planning, early and frequent communication, training and capability building, change management and adequate deployment support.

4.2 Use of external providers

Developing Regtech solutions in-house vs using third-party providers

Regtech solutions can be developed in-house or provided by an external vendor. 61% of the surveyed banks that have adopted Regtech solutions use third-party providers (Figure 14). A number of factors need to be considered to help decide which approach can bring the greatest benefit.

Developing Regtech solutions in-house allows a greater level of customisation and helps to train staff and expand their skillset in parallel. However, the time, resources and effort spent in developing a solution from scratch can be significant.

Purchasing readily available third-party solutions can save time and resources, and provides banks with the comfort of a proven track record. Third-party vendors typically possess domain expertise, which banks can leverage to assist with implementation. However, these readily available solutions may not be fully compatible with existing infrastructure and policies, and can therefore be challenging to integrate.

There is no one-size-fits-all approach. In order to ensure the successful implementation of Regtech, banks should carefully weigh the pros and cons of whether to develop a solution in-house or to purchase third-party solutions.

Five key attributes of an effective partnership

While partnering offers numerous benefits, including access to talent, enablement of a portfolio approach and increased speed to market, it is not a straightforward process. Organisations that have established partnerships have found themselves mired in roadblocks, from lacking the APIs required to enable seamless integration to the time-consuming process of establishing governance structures and risk management processes. Without strong guiding principles and a strategy for managing

Figure 14: Responsible parties for the development of Regtech solutions at surveyed banks
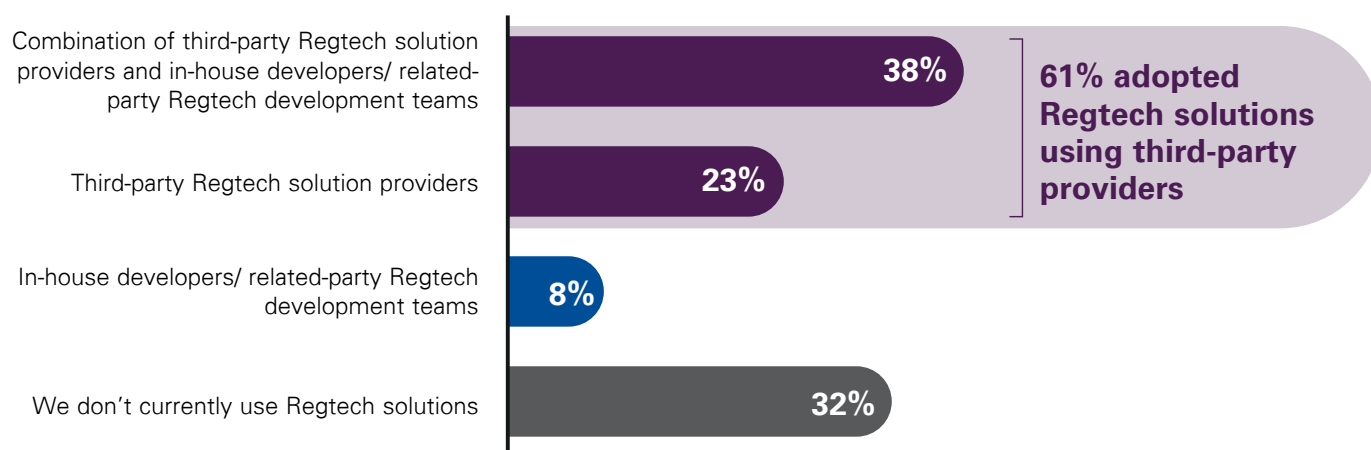
Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

partnerships, it is highly unlikely that financial institutions will be able to achieve the full value that working with Regtech companies can provide.

The ability to forge successful partnerships will be a key strength of a successful bank in the future. Developing Regtech partnerships requires a significant amount of time and effort from financial institutions – both to identify the right Regtech companies with whom to partner, and to ensure the resulting partnerships are structured so that both parties can achieve their desired objectives. A KPMG survey[34] identified five key themes for effective partnerships for fintech companies that can be applied to Regtech. These include:

1   **Focus:** Leading companies know what goals they want to achieve or issues they want to address through Regtech and potential partnerships with Regtech companies. When looking for opportunities, leading financial institutions start with the problem rather than the technology to ensure there is demand for a solution and that any solution provides the required value. Before attempting to 'plug and play' a Regtech solution or partner into their organisation's operations, they work to ensure activities are well aligned in order to reduce integration challenges.

2   **Evaluation framework for Regtech:** Creating and using strong evaluation frameworks are an important part of ensuring that any Regtech partnerships are well positioned to achieve specific outcomes. Leading companies use frameworks aligned to their business strategy, specific pain points and desired

outcomes, in addition to the specific characteristics of the Regtech being evaluated (e.g. the quality of the Regtech company's management team, the alignment of its strategic objectives with your own, its technology capacity, the scalability of technology solutions, potential integration challenges and cultural differences).

3   **Outside the box thinking:** In today's constantly evolving Regtech environment, effective partnerships can be established with a variety of different organisations, from Regtech start-ups and technology giants to companies in ancillary industries, to actual business competitors. Leading companies look beyond traditional boundaries to form partnerships, forging alliances with companies well beyond their own sector in order to leverage insights, solutions and opportunities.

4   **A global mindset:** Regtech innovation is evolving in unique ways in many different geographies as a result of their unique skills bases, innovation centres, government priorities and collaborations. Leading companies often have a presence in key Regtech ecosystems in order to stay on top of signals of change and to help identify potential partners from outside their local jurisdictions.

5   **Experienced advisors:** When it comes to identifying and establishing partnerships, many leading companies have a network of advisors who can supplement their existing skill sets and provide assistance with evaluating partnership opportunities and with managing the legal and risk management issues that might arise during the development and execution of any partnership arrangements.

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34 Forging the future: How financial institutions are embracing fintech to evolve and grow, KPMG International (October 2017), https://assets.kpmg/content/dam/kpmg/xx/pdf/2017/10/forging-the-future-global-fintech-study.pdf

05

Recommendations to promote the adoption of Regtech

5.1 Vision and introduction to the recommendations

Section 2 outlined how widespread adoption of Regtech in Hong Kong presents significant benefits to the banking ecosystem in Hong Kong and to the overall economy. There are considerable opportunities to help those institutions that are 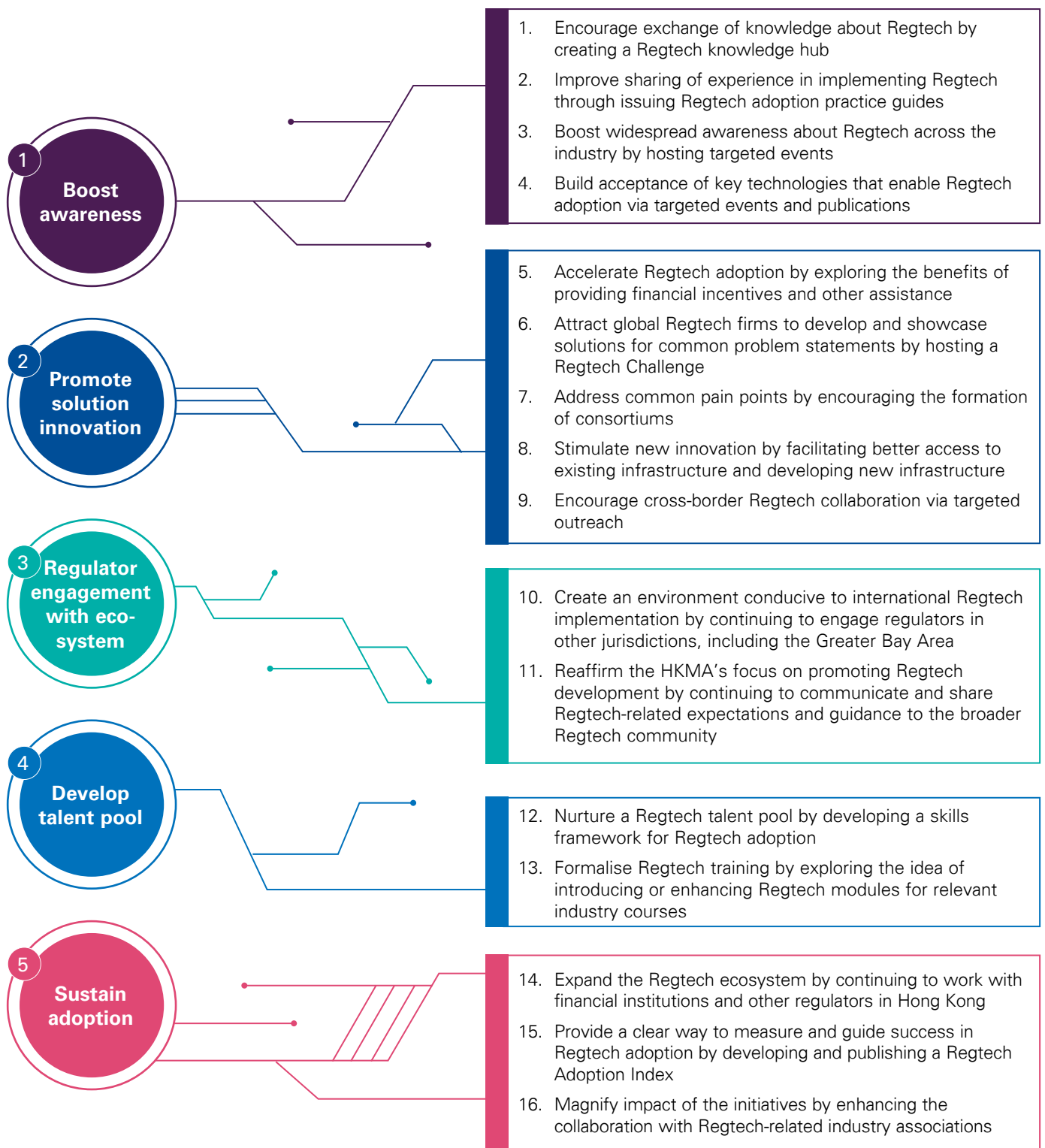yet to implement Regtech and guide those that have adopted solutions to improve implementation and expand use cases into emerging areas. Hong Kong has the right ingredients to support a thriving Regtech ecosystem: broader fintech capabilities, strong support for technology businesses, a large financial sector and a supportive regulator.

To help stimulate and focus development, Hong Kong should aim for **a number of goals:**

- Hong Kong as a global leader in Regtech

- Extensive adoption of Regtech in the Hong Kong banking sector

- Breeding ground of Regtech solutions for financial institutions

- Hong Kong as a hub for nurturing Regtech talent.

This white paper sets out 16 recommendations across five core areas which, if realised, would help to accelerate Regtech adoption in Hong Kong and meet these outcomes (Figure 15). The recommendations highlighted below have been formulated based on the survey findings, interviews with industry stakeholders, benchmarking and analysis of Hong Kong's progress thus far and a comparison with observations and developments in other jurisdictions.

Figure 15: Summary of recommendations

1 Boost awareness

1. Encourage exchange of knowledge about Regtech by creating a Regtech knowledge hub
2. Improve sharing of experience in implementing Regtech through issuing Regtech adoption practice guides
3. Boost widespread awareness about Regtech across the industry by hosting targeted events
4. Build acceptance of key technologies that enable Regtech adoption via targeted events and publications

2 Promote solution innovation

5. Accelerate Regtech adoption by exploring the benefits of providing financial incentives and other assistance
6. Attract global Regtech firms to develop and showcase solutions for common problem statements by hosting a Regtech Challenge
7. Address common pain points by encouraging the formation of consortiums
8. Stimulate new innovation by facilitating better access to existing infrastructure and developing new infrastructure
9. Encourage cross-border Regtech collaboration via targeted outreach

3 Regulator engagement with eco-system

10. Create an environment conducive to international Regtech implementation by continuing to engage regulators in other jurisdictions, including the Greater Bay Area
11. Reaffirm the HKMA's focus on promoting Regtech development by continuing to communicate and share Regtech-related expectations and guidance to the broader Regtech community

4 Develop talent pool

12. Nurture a Regtech talent pool by developing a skills framework for Regtech adoption
13. Formalise Regtech training by exploring the idea of introducing or enhancing Regtech modules for relevant industry courses

5 Sustain adoption

14. Expand the Regtech ecosystem by continuing to work with financial institutions and other regulators in Hong Kong
15. Provide a clear way to measure and guide success in Regtech adoption by developing and publishing a Regtech Adoption Index
16. Magnify impact of the initiatives by enhancing the collaboration with Regtech-related industry associations

Source: KPMG analysis

5.2 Boost awareness

Clear advantages to raising awareness of Regtech and its associated benefits; events play a key role in this

The research for this white paper points to a clear need to increase awareness of the potential benefits of Regtech and Regtech solutions available to the banking industry in Hong Kong. 40% of banks cited a lack of awareness of Regtech solutions or their potential value as a top five adoption barrier, while surveyed Regtech providers highlighted this as their second highest barrier to adoption.

Many banks do not know where to find comprehensive information about Regtech adoption

A number of bank interviewees have suggested that they do not know where to find relevant detailed information about Regtech, which may end up slowing the rate of overall Regtech adoption in Hong Kong's banking industry.

The HKMA's Fintech Supervisory Chatroom is one initiative that both interviewed banks and Regtech providers cited as helping to raise awareness and centralise discussion

and interaction between stakeholders. As at 31 July 2020, about 22% of all enquiries in the Chatroom were related to Regtech.

While the Chatroom has proven to be a helpful medium to centralise discussion around Regtech, there is also a need for information, use cases and guidance to be centralised to help increase awareness, encourage knowledge sharing and ultimately drive greater adoption.

Other centralised platforms have proven successful

Similar centralised platforms set up by Hong Kong government agencies have proven successful for other initiatives, such as InvestHK's Fintech HK website. This standalone website targets a wide range of users and includes detailed information on areas such as guidelines on setting up a fintech business, relevant fintech use cases, and related news and events.

In the UK, the FCA has a Regtech knowledge hub that allows easy access to a variety of Regtech-related publications, news and circulars, as well as a dedicated advice unit for eligible companies. It also includes useful information on FCA initiatives such as the digital sandbox pilot and TechSprints[35].

Recommendation 1

Encourage exchange of knowledge about Regtech by creating a Regtech knowledge hub

Develop a Regtech knowledge hub that acts as a central repository of all Regtech-related content and knowledge sharing for the Hong Kong banking industry. It could also potentially extend to other financial institutions and beyond.

Knowledge hub content could include past issues of Regtech Watch, the Regtech adoption practice guides (which are outlined in Recommendation 2), links to guidance and circulars related to Regtech, curated articles and secondary resources, details of upcoming events, Regtech-related FAQs, and external links to relevant industry associations and other financial services regulators.

More detailed guidance is a key ask from the industry

The HKMA's "Regtech Watch" newsletter has been helpful in promoting the adoption of Regtech in the banking industry. Interviewed banks cited these newsletters as a valuable souce of information and guidance, especially the actual or potential Regtech use cases that have been

rolled out or are being explored in Hong Kong or elsewhere. Four issues of Regtech Watch have been issued since its launch in November 2019. The inaugural issue covered cyber risk management, followed by an issue on credit risk management in March 2020, on AML/CFT in June 2020, and on conduct risk management in September 2020.

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35 Regtech, Financial Conduct Authority (September 2020), https://www.fca.org.uk/firms/innovation/regtech

While acknowledging regulatory efforts so far to provide guidance on the adoption of Regtech, a number of interviewees hope to receive further elaboration on the potential application and benefits of Regtech. In line with the interviews, 32% of surveyed banks ranked the issuance of 'Regtech adoption practice guides' as the most effective potential initiative for promoting Regtech adoption in the banking industry in Hong Kong. This was ranked as the top initiative consistently among a broad cross-section of banks, including locally and overseas incorporated banks, and among banks with different asset sizes. Surveyed respondents that had implemented solutions – which includes the virtual banks – also cited Regtech adoption practice guides as the top potential initiative, indicating that even the industry players that are generally further along in their Regtech adoption journey would benefit from more guidance.

With this white paper identifying 26 specific application areas of Regtech that can benefit financial institutions, there are significant opportunities and a desire from the industry for the HKMA to develop and issue Regtech adoption practice guides. This should include more guidance on implementation and advice on overcoming barriers.

Recommendation 2

Improve sharing of experience in implementing Regtech through issuing Regtech adoption practice guides

Develop a "Regtech Practice Guides" series that could potentially build on or supersede the "Regtech Watch" newsletter series.

These practice guides should continue to incorporate useful elements of Regtech Watch (e.g. highlighting existing industry challenges, raising awareness of how Regtech can help address these challenges, identifying potential Regtech use cases).

The practice guides should explore areas beyond the current scope of Regtech Watch:

- **Elaborate on existing industry challenges and potential benefits** of Regtech solutions based on the survey and interview findings, as well as ongoing engagement with industry through both regular supervisory activities and Regtech-specific engagement activities.

- **Provide more implementation guidance** on specific regulatory areas that the industry commonly finds challenging to interpret or is unsure of regulators' expectations. The guidance should be granular enough for banks and Regtech firms to identify an adoption process that is in-principle applicable to their circumstance, with a reasonable degree of confidence that regulators' expectations have been met.

- **Draw upon learnings** from prior use cases from banks, enquiries from the Fintech Supervisory Chatroom, learnings from the FSS, as well as other relevant engagement with the industry, including Regtech firms. This should include advice on overcoming barriers to adoption.

Each practice guide should focus on an area of Regtech application and seek to prioritise areas that have been identified as having the greatest potential impact on increasing adoption rates across the industry and/ or promoting awareness.

Opportunity to expand the range of events in order to reach different stakeholder groups

There are already a number of events in Hong Kong that are well regarded by the industry. This includes large events such as Fintech Week. While the large events can attract a sizeable audience, they tend to be focused on participants that already have an interest in this space.

Effective Regtech adoption requires a range of stakeholders from across the organisation to buy in and collaborate in order to drive success. However, interviewees cited that Board members and senior and middle management are not well targeted by existing events.

These individuals play a key role in originating, implementing and signing off on Regtech-related initiatives. Their awareness of the benefits of Regtech and support for related initiatives is therefore essential.

Insights from interviews highlighted that there is also a need to increase awareness among banks' regional and global senior management. This is particularly important in Hong Kong, where a number of foreign bank branches have Regtech solutions driven from a global level. The recent widespread adoption of video conferencing for events in response to COVID-19 may unlock new opportunities to encourage management in different jurisdictions to more actively participate in virtual events hosted in Hong Kong, therefore increasing their awareness of Regtech solutions and benefits.

Regulator involvement in events is viewed by the industry as a clear demonstration of commitment

Banks and Regtech providers stressed the importance of the HKMA's presence and participation in events to help support the promotion of Regtech in Hong Kong. Hosting Regtech events was cited by surveyed banks and interviewed overseas regulators as one of the most effective initiatives to promote adoption in Hong Kong. The HKMA's AML/CFT RegTech Forum held in November 2019 generated positive feedback from the industry, and has helped to increase awareness about AML/CFT as a key application area for Regtech.

Recommendation 3

Boost widespread awareness about Regtech across the industry by hosting targeted events

Hosting targeted events will help to galvanise the global community and act as a clear indicator of commitment in this area. These events should take some of the following points into account:

- **Regulator to play a prominent role:** Regulators' active participation in events significantly raises the profile of the event and attracts higher attendance rates.

- **Content:** The focus should be on the benefits of Regtech solutions, successful implementation and details on how to implement solutions. This can also involve training and new approaches to upskill talent.

- **Follow a combination of formats:** Host both large-scale events and smaller niche events to focus on different objectives and groups of participants. Consider the use of different formats such as keynote speeches, panel discussions, curated live demonstrations, break-out sessions and workshops. While the COVID-19 pandemic has had an impact on physical events, it has also shown that fully virtual or a combination of online and in-person events can be equally, if not more, impactful and effective. A virtual event also provides the opportunity to expand the scope of the potential audience to include stakeholders from regional and global banks' headquarters or other offices, and Regtech solution providers from different jurisdictions.

- **Target different groups:** Awareness needs to be raised across different groups ranging from Board level and senior management to middle management and project working level staff of banks. Targeted groups also vary by functional background, ranging from risk and compliance to IT and other business functions.

- **Involve Regtech firms and professional service providers:** These events also serve as networking opportunities to connect banks with Regtech firms and other professional service providers.

- **Use industry associations as a multiplier:** Industry associations can play a key role in organising or co-organising events, developing content and promoting events to their members.

- **Consider how to engage stakeholders in head office:** Awareness and support needs to be built at all levels of decision making. This means that certain events should aim to attract senior management from regional and global head offices.

Several technologies underpin the adoption of Regtech

Regtech is underpinned and enabled by a number of prominent established and emerging technologies across a range of compliance and risk management use cases. As shown in Section 2.3, a wide range of technologies can be harnessed to develop Regtech solutions, ranging from more established technologies such as cloud to more emerging areas of NLP and OCR. In particular, cloud is considered a fundamental underpinning technology for Regtech that banks need to be comfortable with before they seriously consider specific Regtech solutions. AI and AI technology is used to underpin more advanced Regtech solutions.

The HKMA's stance on key underpinning technologies has been defined, but more promotion and guidance could further help to drive adoption

There is an opportunity for the HKMA to drive Regtech adoption by further promoting its stance on key underpinning technologies for Regtech, such as cloud and AI. 23% of surveyed banks perceive the regulators in Hong Kong as having a negative sentiment towards cloud-based Regtech solutions (Figure 16). With many Regtech providers leveraging cloud as a foundational technology for their solutions, this perception is a significant challenge to Regtech adoption.

Figure 16: Surveyed banks' perception of Hong Kong regulators' views on the use of cloud-based Regtech solutions

Positive	**43%**
Neutral	**34%**
Negative	**23%**
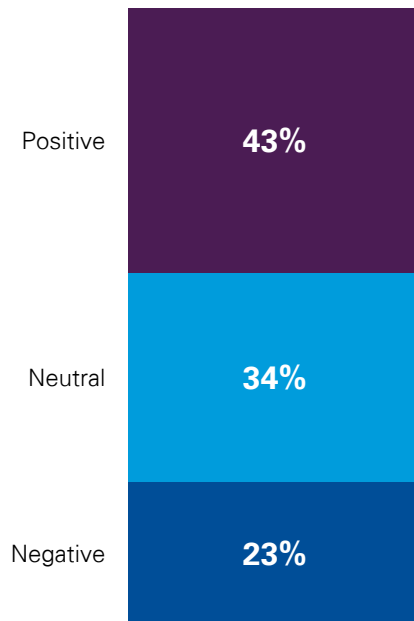
Source: HKMA Regtech Survey for Authorized Institutions, KPMG analysis

The HKMA has set out its position on the adoption of cloud-based technology solutions in the *Risk Assessment Form on Technology–related Outsourcing (including Cloud Computing) Project*, which guides banks through the assessment process. There are an increasing number of industry use cases where banks have undertaken this assessment process and successfully deployed cloud-based solutions. Promotion of these success cases would be beneficial to other banks that have not yet adopted cloud-based technology solutions.

In recognition of the increasing number of banks adopting AI-based technology solutions across an expanding range of applications, the HKMA issued two circulars in November 2019 – *High-level Principles on Artificial Intelligence*[36] and *Consumer Protection in respect of Use of Big Data Analytics and Artificial Intelligence by Authorized Institutions*[37]. The circulars seek to provide high-level guidance to the banking industry on the use of AI applications and key considerations when building big data analytics and AI platforms. Building on these circulars with promotional events and supplementary publications would be helpful in raising awareness about the HKMA's expectations on the application of these key technologies.

Recommendation 4

Build acceptance of key technologies that enable Regtech adoption via targeted events and publications

Consider issuing a set of high-level principles on the use of cloud technology to clarify expectations and facilitate the adoption of cloud-based Regtech solutions.

This can be followed up with targeted events or publications to help the industry to better understand the HKMA's expectations on the application of key technologies that power Regtech solutions. This is also an avenue to share what is possible and use cases that have been successful.

These events and publications could take the form of seminars and guidance papers.

5.3 Promoting solution innovation

Clear need to enhance maturity of solutions and greater localisation of solutions

As outlined in Section 3.2 (Regtech adoption challenges), a lack of solutions tailored for the local regulatory/ linguistic environment in Hong Kong features prominently as a key barrier to adoption. Bank interviewees cited a number of instances where some Regtech solutions developed in other markets did not adequately address local regulatory requirements, or were not suitable for the bank's specific business or operational circumstances and setup.

Interviewed banks and Regtech providers also pointed out that Hong Kong is a relatively small market, at least for retail banking, and one where developing tailored solutions is not always cost effective. There is therefore a need to foster solution innovation in order to make Regtech development and adoption more cost effective for both banks and Regtech providers, and to ensure that there is greater tailoring of solutions that address local issues. This suggests the need for intervention to create a virtuous cycle where more localisation of solutions can drive greater adoption and lower costs, which in turn could lead to more localisation.

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[36] High-level Principles on Artificial Intelligence, Hong Kong Monetary Authority (November 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20191101e1.pdf

[37] Consumer Protection in respect of Use of Big Data Analytics and Artificial Intelligence by Authorized Institutions, Hong Kong Monetary Authority (November 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20191105e1.pdf

Cost management is a key focus for banks

The current challenging external environment has placed cost management front and centre for banks. 'Budget and resource constraints' was cited by surveyed banks as the top barrier to Regtech adoption. While Regtech solutions can help banks to reduce costs, the upfront investment is often difficult to fund for many banks that are managing tight budgets. To address this, there is an opportunity to provide financial incentives to foster the innovation and development of solutions.

Similar jurisdictions offer financial incentives to help stimulate solution development

In Singapore, MAS and the SFA have a variety of funding schemes to accelerate technology adoption in the financial services sector. There are nine grants that target fintech solution development, adoption or establishment of a technology innovation hub in Singapore. Financial institutions and fintech firms in Singapore have tapped into these grants to implement Regtech projects.

Both interviewed banks and Regtech providers pointed to financial incentives and assistance such as these as positive initiatives that would help attract more Regtech providers to expand local operations, spur greater solution innovation, and cater to a wide range of bank needs.

Hong Kong has a number of examples of financial incentives being used to boost innovation

There are several examples of financial incentives being used in Hong Kong to successfully stimulate technology innovation. The Innovation and Technology Commission has initiatives such as the Enhanced Tax Deduction for R&D - Designated Local Research Institutions (DLRI) to encourage more enterprises to conduct R&D activities in Hong Kong, and a Technology Voucher Programme (TVP), which aims to support local organisations in using technological services and solutions to improve productivity, or upgrade or transform their business processes.

Recommendation 5

Accelerate Regtech adoption by exploring the benefits of providing financial incentives and other assistance

The provision of financial incentives could stimulate Regtech solution development and increase adoption, especially among the 75% of surveyed banks and 55% of Regtech providers that cited budgetary constraints as a key barrier to adoption.

The HKMA could explore the establishment of a scheme to provide financial incentives for banks and Regtech providers to develop and adopt Regtech solutions. Several aspects can be considered, such as partial funding up to a cap, targeted funding by bank/ Regtech size or development stage, and ensuring that as much of the financial incentives as possible are used for Hong Kong-based activity. Other factors for consideration include ensuring that regulatory observers are present at key milestones to monitor progress and learn, and making sure learnings are fed back to the wider ecosystem.

Alternatively, the HKMA could also explore the provision of other assistance to banks and Regtech companies to encourage Regtech solution innovation and development in Hong Kong – for example, partnering with business parks and hubs to provide office space to Regtech providers, and providing Regtech companies with greater access to test data and environments, thereby lowering entry barriers.

'Hackathon' or 'Hackcelerator'-style events can be used to rapidly develop use cases

A hackathon is an event where teams of solution providers come together for a short period of time to develop solutions that solve a particular pain point. They usually involve some kind of incentive, are effective at solving issues extremely rapidly, and can be useful for developing Regtech solutions. They have secondary benefits of acting as an awareness tool to demonstrate the ability of technology to solve a problem, as well as attracting investment and/ or partnership opportunities with venture capital and private equity firms. A Hackcelerator is a similar concept, except the time period is extended, usually lasting for a couple of months. This allows for a greater focus on the coaching and mentorship aspects, creating more partnership opportunities for participating teams with potential clients and investors.

Both the UK FCA and MAS have used Hackathons and Hackcelerators to great effect for Regtech-style issues. For example, the FCA's TechSprints are typically 2-day events of varying scale and size that bring together a wide range of ecosystem stakeholders to showcase fintech – including Regtech – solutions or POCs to address specific industry pain points. The MAS Global FinTech Hackcelerator is a 12-week programme co-hosted by KPMG since 2016. It seeks to create and match solutions with industry needs. Each year, 20 finalists are selected across three focus areas and a general category. These finalists work with key stakeholders from the financial services industry (for example, Chief Risk Officers, Heads of Fintech and Innovation) to contextualise their solutions to client and industry needs. Three winners receive a total cash prize of SGD 150,000, and all 20 finalists receive fast-tracked applications for MAS's Financial Sector Technology and Innovation (FSTI) Proof-of-Concept grant. To date, a large portion of the winners have progressed their solutions to the POC stage with banks.

Recommendation 6

Attract global Regtech firms to develop and showcase solutions for common problem statements by hosting a Regtech Challenge

A Regtech Challenge that resembles a hackcelerator-style event would help to attract start-ups, corporates and investors from across the industry globally to develop technology-based ideas or POCs to address industry challenges that are specific to Hong Kong. There are a number of common practice areas that can be adopted around the definition of clear, real-life problem statements, ensuring the opportunities are made for lasting partnerships (e.g. potential clients and investors as judges and/ or mentors) and ensuring that participants have adequate supporting data sets and technology.

Consortiums are effective vehicles to pool resources to develop solutions

A consortium, where several financial institutions work on a solution, can help to pool resources to develop solutions that benefit all. This is particularly useful where the investment required or risk involved to develop a solution is not commensurate with the benefit for a single provider. A consortium can help to agree on a set of common standards that facilitate Regtech as well as investment in technology. A number of interviewed banks agree that the formation of consortiums could help to accelerate Regtech solution development in the banking industry in Hong Kong. Furthermore, a number of banks indicated their willingness to participate in such a consortium.

There are examples of successful use of consortiums in this space. For example, the FCA and the Bank of England (BoE) jointly introduced Digital Regulatory Reporting to make regulatory reporting more efficient and effective[38].

Between 2018 and 2019, the BoE and FCA collaborated with seven banks to complete two pilots on Digital Regulatory Reporting, which are showing positive progress.

A number of interviewees noted that there is a key role for the regulator to identify common pain points, set specific problem statements, work with intermediaries such as industry associations to form consortiums, set clear standards and offer guidance to the consortium. There are several principles that have worked well in other markets that should be adopted when considering a consortium. For example, it should not be in an area where participants could expect to gain a competitive advantage. It should be an area of high cost or burden to financial institutions. It should also not be an area exposed to high reputational risk, and most importantly, the use case has to be very compelling for a large number of financial institutions. Commentators in other markets also stress the importance of getting a few big banks involved first.

Recommendation 7

Address common pain points by encouraging the formation of consortiums

Industry, regulators and industry bodies should work together to identify and form consortiums to address specific Regtech challenges. A number of initial problem statements for further consideration include regulatory reporting, stress testing for regulatory purposes and model validation.

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[38] Digital regulatory reporting, Financial Conduct Authority (July 2020), https://www.fca.org.uk/innovation/regtech/digital-regulatory-reporting

Solution innovation requires the right infrastructure

Interviewees stressed the importance of having the right infrastructure to enable Regtech providers to build their solutions. This involves centrally maintained databases and infrastructure to help adoption. There are a number of examples that often required collaboration across regulators and government to implement. Such solutions are sometimes grouped as part of a 'Smart City' initiative.

Singapore's 'SingPass' is a commonly cited example of this. SingPass is an authentication system for citizens to transact with government agencies online, allowing users to access government digital services easily and securely (e.g. tax payment, payment for driving licence). For banks, it helps with on-boarding and biometric identification (fingerprint or facial recognition) to log in to digital services.

Another example is MRR, which refers to the use of technology by regulators and financial institutions to automate the dissemination and processing of regulatory requirements. An internal HKMA study on MRR found that the relevant technical standards (e.g. use of AI and machine learning techniques to interpret regulations)

are still at an experimental stage, while the coding of regulations into computer programmes has only been tested on a very limited scale. The study also showed that the general preference of banks is to explore the use of MRR to facilitate (as opposed to replace) the human process of compliance.

In the area of regulatory data reporting, the study found that instructions need to be codified while data needs to be structured and compiled in standardised forms for machine recognition and execution. This is currently at an early stage of development. There is therefore a need to invest in infrastructure that can facilitate standardised and enhanced regulatory reporting.

Apart from infrastructure, having access to appropriate data sets can help Regtech firms and banks with the solution development and testing process. ASIC has previously provided curated data sets to Regtech firms to showcase their solutions at a series of symposiums. The FCA has launched a digital sandbox with a focus on providing synthetic data sets to a range of stakeholders, including incumbents, Regtech firms, technology providers, academics and regulators, to test technology solutions.

Recommendation 8

Stimulate new innovation by facilitating better access to existing infrastructure and developing new infrastructure

Consider providing better access to existing infrastructure, investing in new infrastructure and the provision of data sets that enable the development of new Regtech solutions. This could be a focus of a Regtech Challenge or other avenues to help develop such infrastructure. Initial technologies for consideration may include electronic dissemination of regulatory policies and upgrades to the regulatory reporting platform.

- **Explore and investigate options to enhance policy assimilation and dissemination processes through the use of emerging technology where available (short to medium term).** Increased automation in such processes would, for instance, assist banks in better monitoring regulatory developments and changes. In addition, the use of tools such as topic and keyword tagging in regulatory documents would complement the searching capability of banks' IT systems and contribute to the effectiveness and efficiency of their regulatory compliance processes.

- **Consider developing a digital reporting regime (longer term)** that incorporates MRR reporting instructions, which is only possible when there is a proven technical standard agreed by the industry. Continue to keep in view the development of emerging IT applications of relevant technologies as the HKMA GDR (Granular Data Repository) initiative proceeds.

- **Consider hosting a Regtech Challenge** featuring a regulatory reporting problem statement to encourage banks to focus on this issue and the potential benefits of MRR in this context. Explore the formation of a consortium to pool efforts and expedite the development of an industry consensus on technical standards.

- **Continue to monitor the government's Smart City initiatives** and engage with Regtech providers and banks to identify other potential infrastructure to explore.

Important to attract global Regtech providers to Hong Kong

In order to harness leading Regtech solutions, Hong Kong needs to attract more global Regtech companies. This would not only give local banks access to a wider range of solutions, but would help deepen the local ecosystem in order to develop critical mass in areas such as talent. It would also help Regtech providers, as Hong Kong has the potential to become a regional hub that can serve a number of markets in Southeast Asia and East Asia, and have clear benefits for the Hong Kong economy in terms of employment, tax revenue and upskilling the workforce.

In addition, the GBA is rapidly transforming into a world-class technology hub with globally renowned tech unicorns and advanced capabilities in a range of fields such as AI and big data. The technology capabilities in GBA cities can be combined with Hong Kong's expertise as an international financial hub to develop internationally recognised Regtech solutions.

Recommendation 9

Encourage cross-border Regtech collaboration via targeted outreach

Targeted events and guidance to encourage cross-border solution development, bringing technology innovation from other markets and developing Regtech solutions within Hong Kong. Events can include presentations, targeted visits and panel discussions, with an emphasis on bringing together financial institutions and Regtech firms across borders to encourage greater sharing of ideas and partnerships. Involvement of regulators from related jurisdictions would be a clear indication of priority.
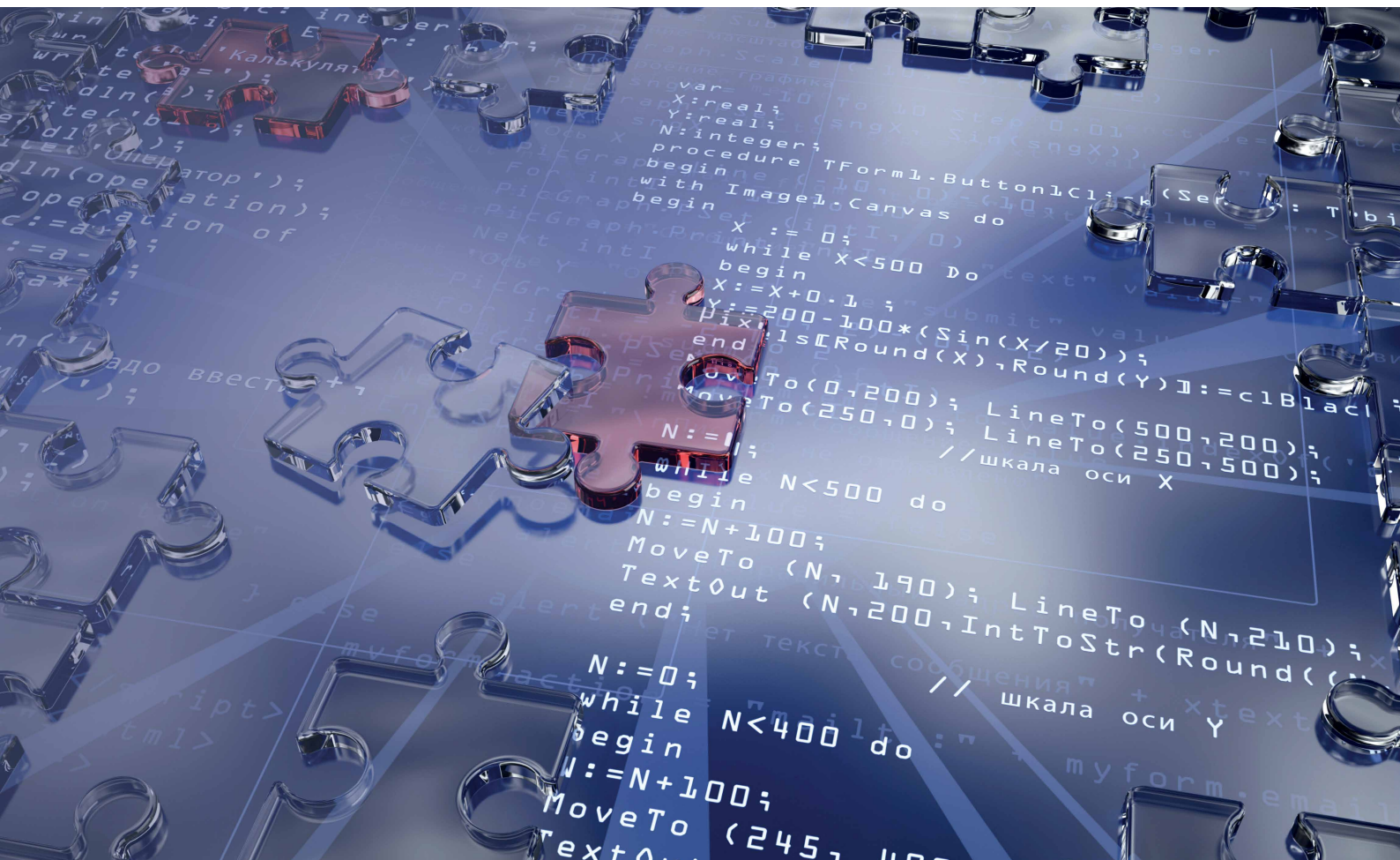
5.4 Regulator engagement with ecosystem

Cross-border alignment of regulatory stance and supervision of Regtech will help promote Hong Kong as a leading financial services hub

A large portion of banks in Hong Kong are headquartered in other jurisdictions. Differences in approach to Regtech across jurisdictions create significant challenges for banks that must align with their group's overall technology strategy. While complete alignment may not always be possible, continued communication and information sharing between regulators and regular participation in cross-border events are nevertheless beneficial for highlighting issues and keeping up with international common practices. Particular focus should be given to alignment with the other major financial services hubs in the region. This will help align regional and global banks with regard to their technology solutions, which is beneficial for the Asia-Pacific region as a whole.

Regional and international engagement could positively impact Regtech adoption

International collaboration is another key driver of a wider Regtech ecosystem. The HKMA has been actively participating in international networks such as the working groups under the BIS and the FSB, as well as GFIN to strengthen Regtech collaboration and experience sharing. Furthermore, collaboration between the respective governments and regulators in Mainland China, Hong Kong and Macau in recent years has yielded a range of welcome technology-related developments such as the expansion of Cyberport, the development and location of research institutions in Hong Kong Science and Technology Parks, and R&D tax incentives. Hong Kong's status as an international financial centre and goal of strengthening innovation and technology leave it well placed to support fintech/ Regtech firms. Industry commentators hope that the positive collaboration and alignment among the regulators can continue.

Recommendation 10

Create an environment conducive to international Regtech implementation by continuing to engage regulators in other jurisdictions, including the Greater Bay Area

Continue to engage and participate in cross-border regulatory groups such as the working groups under the BIS and the FSB, as well as GFIN to align Hong Kong's Regtech regime with international common practice, and to facilitate Regtech collaboration and experience sharing.

The regular issuance of detailed Regtech-related guidelines, FAQs and circulars reaffirms the HKMA's focus on promoting Regtech innovation and adoption

HKMA circulars and guidelines related to Regtech and its underpinning technologies have been well received by a number of interviewees. Interviewees also have a positive view of the transparency and overall communication efforts displayed by the HKMA. Keeping this momentum going through the regular issuance of detailed guidelines and circulars will help to advocate the HKMA's role as a facilitator of Regtech innovation, and promote Regtech adoption in Hong Kong.

There is a balance to be struck between following a principle-based approach and detailed guidance. Most financial institutions agree that a principle-based approach is preferable, but there are certain more commoditised areas where clear, detailed guidance is helpful. One cited example was in setting a margin of error in the number of ID cards that were electronically verified, which in the absence of guidance, many in the industry may have assumed to be 0%. This resulted in the delay of the rollout of the technology.

Involvement of Regtech firms is crucial to the overall level and quality of solution innovation in Hong Kong.

To ensure that solutions address the needs of banks and are appropriate and compliant with banking regulations, the HKMA should continue to engage, communicate regulatory expectations and provide guidance to the broader Regtech community.

Recommendation 11

Reaffirm the HKMA's focus on promoting Regtech development by continuing to communicate and share Regtech-related expectations and guidance to the broader Regtech community

Continue to issue circulars, FAQs and more detailed guidelines with clear messaging on Regtech-related developments and issues to maintain transparent and regular communication with the industry. These should be disseminated beyond banks to the broader Regtech community, including Regtech firms, and should address areas where the industry commonly asks for regulators' expectations on specific issues. This helps to avoid potential misinterpretations of the regulatory stance on technology solutions. The content of guidelines should be at a level of detail that adequately addresses common issues encountered by banks during the process of adopting Regtech solutions.

5.5 Develop talent pool

A need to address Regtech-related skill and experience gaps in Hong Kong

44% of surveyed banks cited the lack of suitably skilled/ experienced talent as a top five barrier to Regtech adoption. The gap lies in finding talent that possesses the right combination of working knowledge of local regulatory requirements, technical skills within the technology and data analytics domain, and business acumen. This includes a number of technical roles at financial institutions across Risk, Compliance, Internal Audit, Operations, and to some extent IT. Resolving this issue requires a combination of upskilling existing talent as well as new hires.

There is anecdotal evidence from multiple interviews that non-technology staff of all levels have found it helpful to attend internal training sessions that shed light on the latest fintech/ Regtech solutions and their underlying technologies. These employees are often users of technology solutions (e.g. customer risk profiling tools for customer-facing staff, GRC tools for risk and compliance teams, regulatory reporting solutions for the finance function), and training sessions enable them to better engage with the Regtech solution selection and implementation process. On the other hand, an observed lack of working level knowledge of regulatory requirements among technology professionals in the industry could also be addressed with relevant focused training.

Interviewees also highlighted the opportunity to better equip regulator supervisory teams with greater knowledge of Regtech solutions. This upskilling helps supervisory teams to better understand the issues and challenges and provide more detailed guidance when discussing Regtech solution implementation with banks.

Potential to embed Regtech skills in the HKMA's ECF framework

The HKMA's Enhanced Competency Framework (ECF) for Banking Practitioners provides a set of competency standards that enables more effective training for new entrants and professional development for existing practitioners. Interviewees pointed out a significant opportunity to build a Regtech module into this framework in order to create industry-wide alignment and foster talent development in this space.

Recommendation 12

Nurture a Regtech talent pool by developing a skills framework for Regtech adoption

Develop a Regtech skills framework that identifies the skills required for different roles to accelerate the adoption of Regtech. This can then be incorporated across the professional areas of the HKMA's ECF. It can also be disseminated to banks themselves for them to develop training internally or share with external service providers.

There are a range of industry and university courses that can help to promote Regtech skills

Risk and compliance staff often hold a number of industry qualifications that may require ongoing professional training. The most notable example is the Financial Risk Management certification, which is targeted at risk management professionals. 325,000 have taken the exam globally over the last 20 years, with 50,000 certified members currently, including more than 1,500 in Hong Kong. Enhanced coverage of Regtech in these qualifications would aid in developing Regtech skills[39]. There are also a number of other courses in Hong Kong related to fintech or targeting attractive groups for building fintech/ Regtech skills.

Recommendation 13

Formalise Regtech training by exploring the idea of introducing or enhancing Regtech modules for relevant industry courses

Explore opportunities to work with third parties that provide relevant courses or target relevant professionals to further deepen the Regtech talent pool. Consider developing Regtech-related content in new or existing modules of relevant industry courses.

5.6 Sustain adoption

Promoting the use of Regtech requires a joined-up regulatory response

Regtech solutions typically factor in a range of laws and regulations from across government and regulators. This can be seen from the range of Regtech solutions involving data protection legislation, tax, company law and financial regulation. For example, according to KPMG analysis, around 60% of the application areas identified in our survey can be adapted to SFC-regulated entities, and around half for the insurance industry. Solution providers can often span across these application areas. There is therefore a need for collaboration across government to work together to drive Regtech adoption in Hong Kong and achieve the outcomes outlined in Section 5.1.

There has been significant progress as a result of ongoing collaboration between regulators in Hong Kong, but more can be done. The single point of entry introduced in FSS 2.0 is widely recognised by banks as an improvement from FSS 1.0 as it encourages collaboration between different regulators and cross-sector pilot testing.

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[39] Financial Risk Manager (FRM), Global Association of Risk Professional, https://www.garp.org/#!/frm

Recommendation 14

Expand the Regtech ecosystem by continuing to work with financial institutions and other regulators in Hong Kong

Involve other regulators and government bodies to ensure opinions from different industry participants are well captured.

Hold regular meetings to align different stakeholders and expedite the development of Regtech initiatives.

Establish a clear mandate and targets to adequately inform different stakeholders and ensure that strategies are leading to the same goal.

It is important to have a clear goal to measure the success of initiatives. Many international organisations already use public indices to track progress towards stated objectives

It is important to have a clear and measurable way to demonstrate and monitor progress so that initiatives can be enhanced and updated. This can be challenging given the difficulties in gathering data and discerning the clear benefits from Regtech adoption. A number of global organisations use indices to track and monitor progress.

The United Nation's Sustainable Development Goal (SDG) Index includes 17 interconnected goals and tracks each country's performance, and publishes an annual report detailing each country's performance against the goals. A range of companies already use the SDGs as a framework to benchmark their performance and assess the impact they are having on society and the environment. The World Economic Forum's Global Competitiveness Index assesses the ability of countries to provide high levels of prosperity to their citizens, and is a key reference for companies looking to improve ease of doing business.

In addition, the Global Fintech Index by findexable and Crunchbase, is a real-time ranking of fintech ecosystems and fintech companies worldwide[40]. The index uses metrics such as the size of the fintech ecosystem and supporting structures, the impact and performance of fintech firms, as well as the environment they are in, to calculate the rankings.

Recommendation 15

Provide a clear way to measure and guide success in Regtech adoption by developing and publishing a Regtech Adoption Index

Develop a Regtech Adoption Index (RAI) that covers actual adoption, intent to adopt, as well as key enablers for adoption. Covering these elements will provide a more holistic and balanced framework to evaluate Regtech adoption among banks in Hong Kong. The introduction of an RAI is likely to convey the regulator's clear commitment to Regtech and their desire to understand the factors that are helping to promote or inhibit adoption. An RAI should measure banks' Regtech adoption propensity and preparedness across four pillars:

- **Investment:** Financial and resource commitments that have been, or are planned to be allocated towards Regtech.

- **Adoption:** Breadth and extent of Regtech application within the bank, their readiness to adopt and the suitability of available Regtech solutions.

- **Talent and culture:** Availability and development of Regtech-related skills, openness to innovation and leadership support.

- **Impact:** Actual or perceived value generated from implementing Regtech.

Industry associations play a key role in the Regtech ecosystem

The presence of industry associations is deemed as important as they act as independent parties, focusing on organising seminars, promoting networking events and working with different stakeholders.

There is an increasing focus on Regtech in Hong Kong. The Regtech Committee within the FinTech Association of Hong Kong helps to stimulate more discussion on Regtech among industry players. The RegTech Association of Hong Kong was formed in the last 12 months by Regtech entrepreneurs.

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[40] Global Fintech Index by findexable, https://findexable.com/

Interviewed banks note that when the HKMA has engaged with Regtech associations and the wider industry, the outcome has been positive. A key example is the AML/CFT RegTech Forum, hosted by the HKMA with the support of a consultant and in collaboration with the FinTech Association of Hong Kong, which was attended by around 400 representatives of banks, tech companies and experts, government agencies, financial regulators and law enforcement agencies who came together and shared insights in grasping opportunities for the use of innovative technology to enhance the efficiency of both banks and the wider AML/CFT ecosystem.

Industry associations and regulators both benefit from close engagement

Interviewed regulators see the importance of engaging with associations as they act as a single channel for regulators to collect information, and help to relay information such as regulatory updates to the community.

The RegTech Association in Australia, founded in 2017, is an independent association made up of about 120 members of FIs, banks and advisors. It organises around two events per month (pre-COVID-19) with a key focus on networking events and their own RegTech Awards, as well as hosting virtual events such as #RegTechEdgeNoBorders and #RegTech4Business, which are targeted at educating the public and members, respectively. ASIC is a key contributor to the development of Regtech as the association attends regular meetings with the regulator, and is given spots at their forums and roundtables.

In Singapore, SFA's Regtech sub-committee enjoys strong support from MAS. It holds frequent meetings with MAS – for example, when developing a consultation paper, opinions will be gathered from the association as it acts as a single channel to consolidate responses from tech providers and other stakeholders.

Recommendation 16

Magnify impact of the initiatives by enhancing the collaboration with Regtech-related industry associations

Explore opportunities to facilitate and enhance collaboration on Regtech-related initiatives across relevant Regtech or fintech associations to focus and accelerate development and adoption.

Consider discussing with the Regtech Committee of the FinTech Association of Hong Kong and the RegTech Association of Hong Kong about increasing their involvement, perhaps as an observer for some meetings to encourage more dialogue on the wider adoption of Regtech.

5.7 Kick-off

The HKMA recognises the importance of advocating its role in promoting and facilitating Regtech adoption in the banking industry in Hong Kong. The impact of each recommendation has been evaluated, factoring in the resources and time required to implement. The views on and progress of these recommendations can be separated into three categories:

- **Planned initiatives:** Initiatives that the HKMA will commit to introduce in the next two years.

- **Existing activities:** Existing activities that go some way to meet the recommendations listed in this white paper. These will be further assessed as to whether these should be expanded in the context of these recommendations.

- **In consideration:** Initiatives that the HKMA will further consider the benefit and feasibility of the recommendation before committing to further implementation.

Activities for each recommendation are summarised in Figure 17. Target kick-off dates are estimated based on current plans, but may be revisited as circumstances change.

Figure 17: Summary of recommendations and progress

Recommendations	Existing activities	Planned initiatives	In consideration
Recommendation 1: Encourage exchange of knowledge about Regtech by creating a Regtech knowledge hub		✓	
Recommendation 2: Improve sharing of experience in implementing Regtech through issuing Regtech adoption practice guides	✓	✓	
Recommendation 3: Boost widespread awareness about Regtech across the industry by hosting targeted events	✓	✓	
Recommendation 4: Build acceptance of key technologies that enable Regtech adoption via targeted events and publications	✓	✓	
Recommendation 5: Accelerate Regtech adoption by exploring the benefits of providing financial incentives and other assistance			✓
Recommendation 6: Attract global Regtech firms to develop and showcase solutions for common problem statements by hosting a Regtech Challenge	✓	✓	
Recommendation 7: Address common pain points by encouraging the formation of consortiums			✓
Recommendation 8: Stimulate new innovation by facilitating better access to existing infrastructure and developing new infrastructure	✓		✓
Recommendation 9: Encourage cross-border Regtech collaboration via targeted outreach	✓		✓
Recommendation 10: Create an environment conducive to international Regtech implementation by continuing to engage regulators in other jurisdictions, including the Greater Bay Area	✓		✓
Recommendation 11: Reaffirm the HKMA's focus on promoting Regtech development by continuing to communicate and share Regtech-related expectations and guidance to the broader Regtech community	✓		✓
Recommendation 12: Nurture a Regtech talent pool by developing a skills framework for Regtech adoption	✓	✓	
Recommendation 13: Formalise Regtech training by exploring the idea of introducing or enhancing Regtech modules for relevant industry courses			✓
Recommendation 14: Expand the Regtech ecosystem by continuing to work with financial institutions and other regulators in Hong Kong	✓		✓
Recommendation 15: Provide a clear way to measure and guide success in Regtech adoption by developing and publishing a Regtech Adoption Index (RAI)		✓	
Recommendation 16: Magnify impact of the initiatives by enhancing the collaboration with Regtech-related industry associations	✓		✓

The following table (Figure 18) summarises additional details about existing activities conducted by the HKMA that align to the recommendations listed in Figure 18.

Figure 18: Summary of HKMA's existing activities related to the recommendations

Rec	Existing activities
2	The HKMA has issued 4 Regtech Watches since November 2019 outlining Regtech benefits and high-level example use cases across Cyber risk, Credit risk, AML/CFT and Conduct.
3	The HKMA hosted the AML/CFT RegTech Forum in November 2019 and published the Record of Discussion to provide supervisory encouragement and set the momentum for ongoing engagement and adoption efforts. The HKMA has also issued 5 circulars since February 2019 articulating the key regulatory principles and sharing good practices of remote customer on-boarding.
4	*'Risk Assessment Form on Technology–related Outsourcing (including Cloud Computing) Project'* issued to set out assessment areas when adopting cloud-based solutions. 2 circulars issued in November 2019 – *High-level Principles on Artificial Intelligence*[41] and *Consumer Protection in respect of Use of Big Data Analytics and Artificial Intelligence by Authorized Institutions*[42].
6	Co-hosting of the Fintech Haccelerator programme with Cyberport, offering banks and stored value facilities operators a platform to run fintech-related competitions such as hackathons and hackcelerators.
8	Conducted a study on MRR suggesting that the relevant technical standards (e.g. use of AI and machine learning techniques to interpret regulations) are still at an experimental stage, while the coding of regulations into computer programmes has only been tested on a very limited scale.
9, 10	Collaboration between the respective governments and regulators in Mainland China, Hong Kong and Macau in recent years has yielded a range of technology-related developments (e.g. Cyberport expansion, Science & Technology Park, R&D tax incentives, cross-boundary technology corporation). By the end of October 2020, the HKMA has signed co-operation agreements with 10 jurisdictions with a view to strengthening fintech collaboration through referral of innovative businesses, information and experience sharing, joint innovative projects, and expertise sharing. In line with international regulatory practices, there are established supervisory cooperation and coordination mechanisms and arrangements (e.g. MoU, bilateral meetings and supervisory colleges) between the HKMA and foreign regulatory authorities. The HKMA also participates actively in international regulatory fora relating to fintech development and supervision: (a) FSB Working Group on Regulatory Issues of Stablecoins to identify potential regulatory and supervisory concerns with respect to stablecoins; (b) FSB Working Group on Cyber Incident Response and Recovery to develop a toolkit of effective practices to assist financial institutions as well as supervisors in preparing for and responding to a cyber incident; (c) Supervision and Implementation Group (SIG) Task Force on Financial Technology to assess the risks and supervisory challenges associated with the innovation and technological changes affecting banking; (d) SIG Operational Resilience Working Group to assess issues related to cyber-risk and broader operational resilience; and (e) GFIN to support financial innovation and to create a framework for cooperation between regulators to share experiences and approaches for innovation.
11	Periodic release of circulars and guidance notes relating to Regtech or underlying technologies.
12	The HKMA's Enhanced Competency Framework for Banking Practitioners provides a set of competency standards that enables more effective training for new entrants and professional development for existing practitioners.

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[41] High-level Principles on Artificial Intelligence, Hong Kong Monetary Authority (November 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20191101e1.pdf

[42] Consumer Protection in respect of Use of Big Data Analytics and Artificial Intelligence by Authorized Institutions, Hong Kong Monetary Authority (November 2019), https://www.hkma.gov.hk/media/eng/doc/key-information/guidelines-and-circular/2019/20191105e1.pdf

14	Fintech Supervisory Sandbox 2.0 introduced the Supervisory Chatroom which allows Regtech providers to participate, greater focus on Regtech, and a single entry point for HKMA, IA and SFC sandboxes.
	Established supervisory coordination and collaboration mechanisms (e.g. memoranda of understanding and bilateral meetings) among the HKMA, SFC and IA on regulatory policy issues and supervisory matters.
	The Government has established high-level cross-sectoral platforms (e.g. Council of Financial Regulators and the Financial Stability Committee) to facilitate effective exchanges on important cross-sectoral regulatory and supervisory issues, including the supervision and monitoring of fintech activities.
16	Memorandum of Understanding with the Applied Science and Technology Research Institute (ASTRI), Cyberport and the Hong Kong Science and Technology Parks (HKSTP) to form a strategic partnership on fintech development.
	HKMA-ASTRI Fintech Innovation Hub to provide a neutral ground where various stakeholders in the fintech industry can collaborate to innovate.
	Co-host Haccelerator programme in collaboration with Cyberport.
	Fin+Tech Collaboration Platform with the HKSTP to support fintech development in a technology-centric approach.

The following table (Figure 19) sets out a high-level roadmap of planned initiatives from the list of recommendations that have been developed to aid implementation over the next two years. For several recommendations, planning is already in an advanced stage in order to meet key annual milestones where there are opportunities to amplify the impact of certain recommendations.

Figure 19: High-level roadmap of planned initiatives from the recommendations

Rec	Roadmap of planned initiatives	Target kick-off
1	Develop a Regtech knowledge hub that acts as a central repository of all Regtech-related content and knowledge sharing for the Hong Kong banking industry.	Q2 – Q3 2021
2	Develop a "Regtech Adoption Practice Guides" series that could potentially build on or supersede the "Regtech Watch" newsletter series.	Q1 – Q2 2021
3	Host a large-scale Regtech event.	Q1 – Q2 2021
4	Devote some of the "Regtech Adoption Practice Guides" series noted above (Recommendation 2) to focus on how to utilise the key technologies enabling Regtech adoption.	Q1 – Q2 2021
6	Host a Regtech Challenge in the form of a hackcelerator-style event.	Q1 – Q2 2021
12	Develop a Regtech skills framework that identifies the skills required for different roles to accelerate the adoption of Regtech.	Q2 – Q3 2021
15	Develop an RAI that covers actual adoption, intent to adopt, as well as key enablers for adoption. The RAI will measure banks' Regtech adoption propensity and preparedness across four pillars – Investment, Adoption, Talent & Culture, and Impact.	Q1 – Q2 2021

06
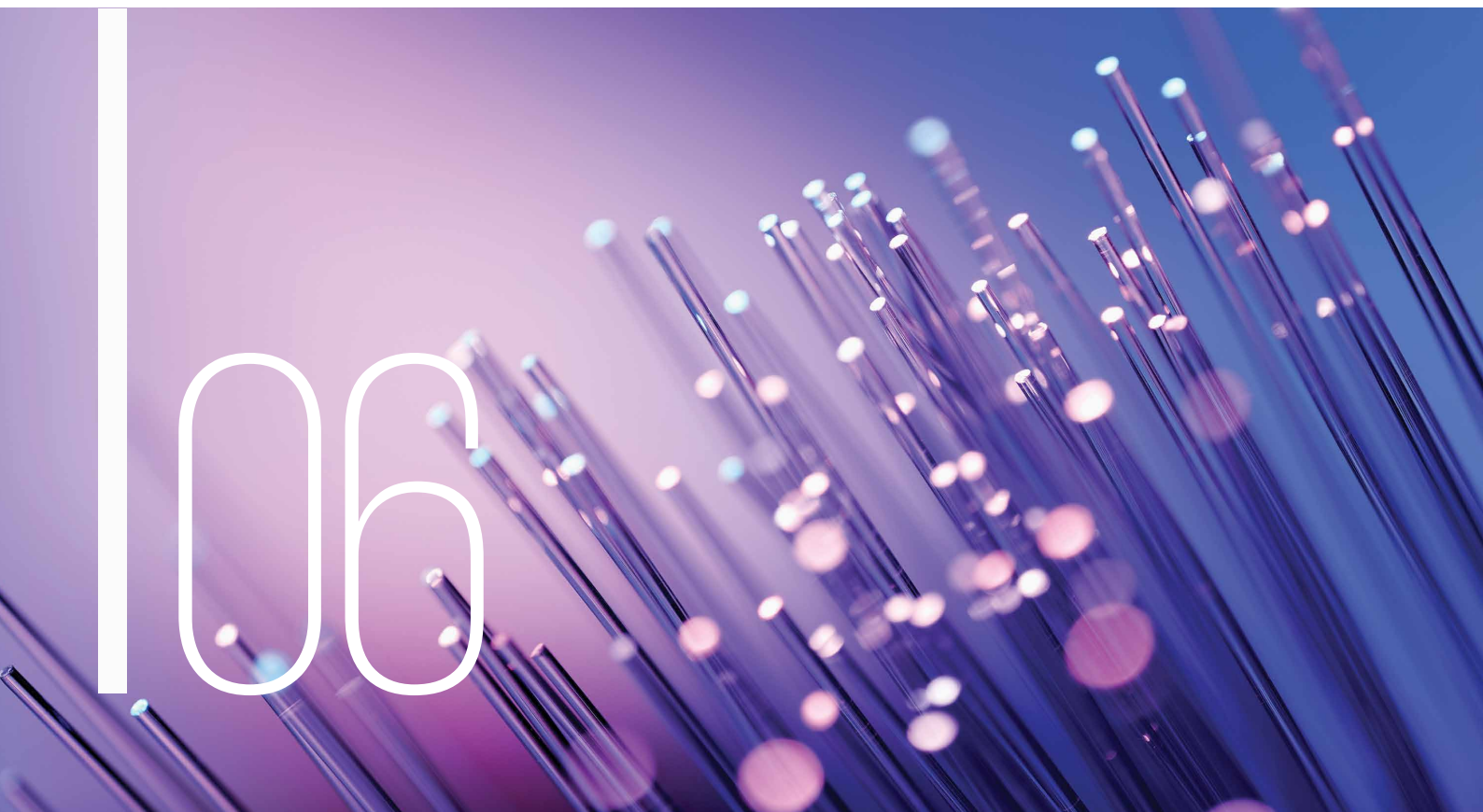
Appendix

6.1 Survey approach

Two separate online surveys targeting Authorized Institutions and Regtech companies were conducted from July until August 2020.

- For Authorized Institutions, the HKMA supported in distributing the survey to 190 Authorized Institutions, and received a total of 133 responses (70%).

- For Regtech companies, we have leveraged KPMG's global network and connection with Matchi, as well as the FinTech Association of Hong Kong's membership base, and distributed the survey to Regtech companies from Hong Kong, United Kingdom, United States, Ireland, Singapore, Australia, South Africa and a number of other jurisdictions.

6.2 Interviewee list

In writing this report, interviews were conducted with industry participants, Regtech service providers and regulators. We would like to thank all of those involved in both the survey and the interviews for their kind participation.

1   Australian Securities and Investments Commission

2   Bank of China (Hong Kong)

3   BIS Innovation Hub, Bank for International Settlements

4   Cathay United Bank

5   Chekk

6   China Construction Bank (Asia)

7   Credit Suisse

8   Financial Conduct Authority

9   FinTech Association of Hong Kong - Regtech Committee

10   HSBC

11   Insurance Authority

12   J.P. Morgan

13   Monetary Authority of Singapore

14   Securities and Futures Commission

15   Standard Chartered Bank

16   Vermeg

17   WeLab Bank

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6.3 About KPMG Matchi

Acquired by KPMG in 2017, Matchi is a leading global innovation and matchmaking platform that connects financial institutions and other large companies, with leading-edge, emerging technology solutions and innovators worldwide. Matchi partners with hosts of Global Innovation Challenges to identify and source targeted, relevant and market-ready emerging technology, as well as promotes challenges to its global community of emerging technology providers.

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