INNOVATION IN COMPLIANCE TECHNOLOGY

EMERGING THEMES AND VENDOR SOLUTIONS

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EXECUTIVE SUMMARY

KEY RESEARCH QUESTIONS

1	*What are the limitations of existing compliance technology?*	**2**	*What are the emerging themes that can address the shortcomings in compliance technology?*	**3**	*Who are the providers of next-generation solutions in compliance?*

Risk and compliance has emerged to be the area of biggest focus in banking and financial services in the last decade, as the key focus of almost all regulatory and political authorities since the crisis of 2008 has focused on mitigating risks to ensure safety and stability of financial markets.

An onslaught of new regulations at global, regional, and local levels, **and the rapid pace of their evolution have increased complexities** of compliance operations manifold**.** The situation is **further compounded by limited technology capabilities** to deal with of regulatory changes, and the **need to analyze growing volumes of data**, most notably unstructured data. **The result is exploding compliance costs** across the board — not only for running regular operations, but also from **heavy fines** due to inadequate controls (and the ensuing reputational damage).

Compliance technology is a wide-ranging theme encompassing technology solutions applied in risk and compliance operations of financial institutions. In this report, we focus on technology solutions dealing with operational risk related issues, such as KYC, AML, surveillance, and regulatory reporting. We discuss four themes that have the potential to solve many of the challenges in compliance.

- **Artificial intelligence and robotic process automation can automate manual processes and enable advanced analytics** needed in KYC, surveillance and fraud operations, and we are seeing growing adoption of them.
- We see unprecedented levels of cooperation among banks to **mutualize noncore activities**, with many firms engaged in developing and using compliance and reporting solutions on a mutualized basis.
- Cloud can be an enabler of both of the above, by offering flexibility and agility in infrastructure. The industry's **attitude toward cloud adoption is changing drastically**.
  - **Whenever there is a need to develop new solutions, we see cloud becoming the preferred choic**e. As banks are having to build new capabilities owing to upcoming regulations, we think the outlook is bright for cloud adoption.
- Distributed ledger technology promises to be a force of disruption in financial services. We are seeing use cases being developed in compliance, most notably in identity management and KYC.

An interesting combination of startup "RegTech" firms and incumbent providers is reshaping the compliance provider landscape, as banks increasingly look to partner rather than invest in in-house technology innovation. **In this report, we discuss in detail 11 vendor solutions and their specific use cases**, with a good mix of start-ups and incumbents, as well as solutions that fall under the themes we have identified.

GROWING IMPORTANCE OF COMPLIANCE OPERATIONS

Risk and compliance has emerged to be the area of biggest focus in banking and financial services in the last decade.

The September 2001 attacks resulted in sea change in regulations relating to terrorist financing and money laundering. But events over the last decade, starting with the financial crisis, exposure of rate rigging and insider trading scandals, disclosures of tax havens, and banks' failure in preventing drug trafficking have drawn immense regulatory scrutiny, and thus added unprecedented demands on risk and compliance operations of financial institutions.

The focus of almost all regulatory and political authorities in the last decade has been on containing and mitigating risks to ensure safety and stability of financial markets. This can be divided into two types of risk:

- Containment of **financial risk** coming from trading in exotic products and instruments (e.g., over the counter derivatives); several regulations such as Basel III, EMIR, and CPMI IOSCO have been proposed to address them.
- **Operational risk** coming from market abuse, insider trading, tax evasion, mis-selling of products, money laundering, and other suspicious activities; regulators have looked to tighten gaps in banks' compliance operations spanning front to back office functions.

Regulatory and policy changes are coming from multiple authorities and at multiple levels.

- Some initiatives are proposed at a global level (Basel III, G20 proposals); some are regional in nature (EMIR, MiFID); but almost all national authorities are adding local nuances to global and regional proposals.
- This in itself is proving to be a major challenge for banks and financial institutions, especially ones with multi-jurisdictional operations and client base. Figuring out applicability of the plethora of regulatory changes to appropriate divisions, lines of business, products, and instruments, as well as client segments, is burdensome.
- Furthermore, **reconciling discrepancies when regulations from different authorities are in conflict is adding pressure**.
- Lastly, **banks are struggling to keep pace with rapid evolution in regulatory environment**.

The result is exploding compliance costs across the board. Heavy fines imposed on numerous banks in recent years have also highlighted the **potential for reputational damage that can result from inadequate compliance controls.**

CHALLENGES IN COMPLIANCE OPERATIONS

***Key Research Question* 1**

What are the limitations of existing compliance solutions?

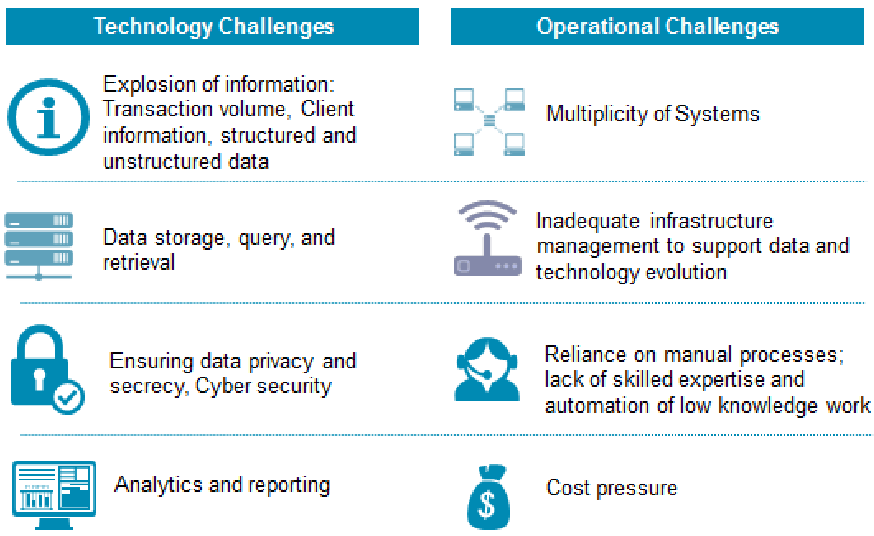
Banks traditionally use in-house and/or best-of-breed solutions that are siloed, static, and simple rule-based, with limited capabilities to support advanced analytics and automated workflows, and thereby relying heavily on manual intervention.

The difficulty of adjusting to regulatory evolution is compounded by operational challenges resulting from growing volumes, explosion in the data universe, speed of change, and inability to deal with them using legacy systems and inflexible technology.

As shown in Figure 1, challenges in compliance operations stem from technology evolution in the external environment, as well as from many shortcomings of current approaches in compliance operations.

- With rapid adoption of technology and digitalization in all aspects of life, there is an **explosion of data and information** — starting from personal data, communication data at individual level through to order and transaction data coming from electronification of growing number of asset classes.
- **The need to analyze unstructured data** — in news, social media, communication, **and overlaying them with structured data analysis** (e.g., trade and trader surveillance) **is becoming increasingly important**.
- **Regulators are proposing strict rules in data management for improving transparency and auditability of data.** Especially, revelations in rate rigging and insider trading have made regulators demand firms keep granular data for a long period of time (e.g., five years), and make them available for audit and investigations on short notice.
- **Data privacy and security continue to be challenging, especially in light of several high profile breaches in cybersecurity** and hacking incidents which have proved even world's largest banks, market infrastructure providers, and technology companies are not immune from breaches.
- Running analytics using expanding volumes and different types of data is proving to be another challenge. **Analytics supported by traditional compliance tools and software mostly deal with structured data and are very basic, rules-based, and highly static in nature**. Therefore it is difficult to run advance analysis and also update them on a regular basis, especially as regulations keep evolving, and screening and analysis need to be performed on a more frequent basis. Automated workflow to report analysis results to internal and external agencies is not well developed.

Figure 1: Challenges in Compliance Operations



Source: Celent

Banks and other financial institutions need to adapt to these changes in their external environment — regulatory and technological — through upgrading their operations; however, current approach to compliance operations is plagued by numerous shortcomings, as can be seen in Figure 1.

- **Multiplicity of systems** — based on lines of business, asset class, and geography of operations — **is a barrier to achieving efficient data management**. This greatly limits banks' ability to run analysis and reporting using different types of data, such as transaction data and communication data.
- This relates to a larger issue of managing overall infrastructure. **Siloed architecture is a bane to running daily operations, as is regularly upgrading them to manage changes.** Even making internal regular changes (e.g., software upgrades) is constrained by traditional approach of using on-premise solutions, which banks are increasingly looking to move away from.
- **Inefficient infrastructure management leads to high dependence on manual intervention in completing compliance operations, a large part of which is spent on doing low-level knowledge work** — such as data collection from different systems, data cleaning, aggregation and consolidation, filing reports, etc. In absence of process automation, compliance professionals can spend as much as two-thirds of their time doing such work, according to industry surveys.
- **These inefficiencies built in years of practices obviously result in high costs**. As banks look to throw more manpower to the onslaught of new regulations, availability of skilled resources is proving to be a challenge. The result is explosion in compliance costs, with some banks witnessing a four- to five-fold increase in compliance budgets.

EMERGING THEMES IN COMPLIANCE TECHNOLOGY

***Key Research Question* 2**

What are the emerging themes that can address the shortcomings in compliance technology?

AI and RPA tools have the potential to remove inefficiencies in compliance operations and offer superior insights. Banks are looking to mutualize compliance operations for further cost savings. Cloud can be an enabler of both, by offering flexibility and agility in infrastructure.

We are seeing an interesting evolution in technology and operational models in response to the several challenges discussed. Compliance technology is a wide-ranging theme encompassing technology solutions applied in risk and compliance operations of financial institutions. In this report, we focus on technology solutions dealing with operational risk issues, such as Know Your Customer (KYC), anti-money laundering (AML), surveillance, and regulatory reporting. Compliance technology is analogous to “RegTech”; however, RegTech is generally used to imply startup companies, whereas in this report we focus on both startups incumbent providers of compliance technology.

We identify four themes that address many of the challenges in compliance. Figure 2 outlines these themes, followed by detailed discussion on each of them. In the following chapter we discuss several vendors and solutions under these themes that illustrate use cases and real life examples.

Figure 2: Emerging Themes in Compliance Technology

Theme	Benefits	Applications
Artificial Intelligence, RPA	• Superior insights in decision making using advanced analytics • Automating low-level knowledge work currently performed manually	• KYC/AML due diligence, alert investigation, link analysis, pattern analysis, surveillance, report generation, process automation
Cloud	• Limited fixed cost, elasticity, flexibility and agility of infrastructure, easy to adapt to regulatory and business changes	• Deployment of AI solutions, mutualization and shared service initiatives in KYC, AML, regulatory reporting, risk calculations
Mutualization	• Cost reduction, Faster time to market, Economies of scale, Superior compliance	• KYC, Regulatory Reporting, DLT solution
Distributed Ledger Technology	• Unique record of identity, real time updates • Cryptographically secured database • No need for reconciliation, centralization	• Identity Management, KYC

Source: Celent

It should be noted that these themes are not mutually exclusive; for example, AI solutions can be deployed using cloud, distributed ledger technology can be mutualized among several banks, and so on.

It should also be noted that the themes and solutions covered in this report are not exhaustive of all trends, but we believe these provide a good sample of important issues influencing compliance operations.

ARTIFICIAL INTELLIGENCE AND ROBOTICS PROCESS AUTOMATION

AI- and RPA-based tools can automate manual processes and enable advanced analytics needed in KYC, surveillance, and fraud operations, and we are seeing growing adoption of them.

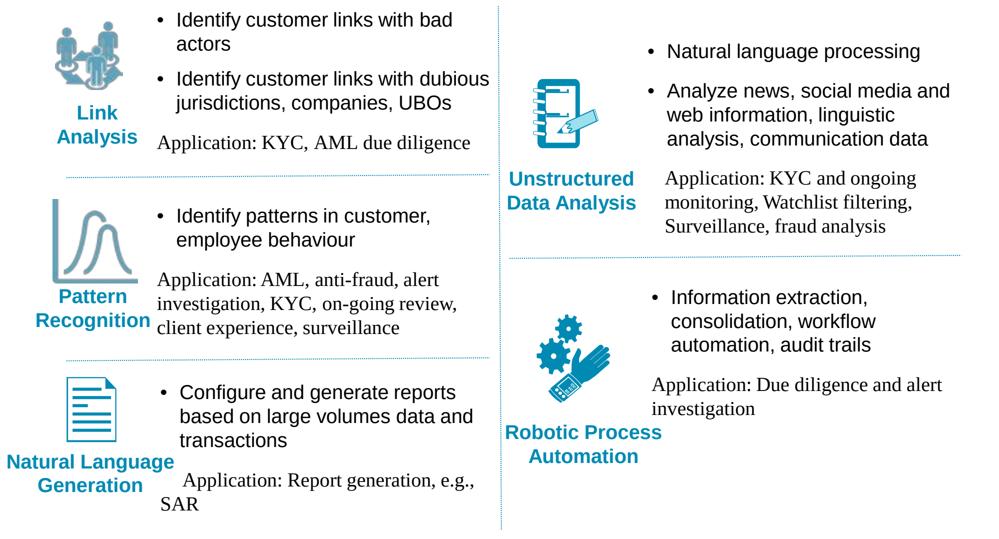
Over six decades in research, AI and machine learning solutions are finally seeing light of the day in the form of commercial offerings, including in financial services. Within the compliance area, we see several use cases emerging in KYC, surveillance, and fraud operation.

Traditional KYC-AML software is highly static and based on simple rules resulting in too many false positives. AI tools can analyze large and different types of data, and learn dynamically to come up with better insights. They are being used to find patterns within structured data (e.g., transaction data) to identify unusual patterns and activities — be they for preventing financial crime and misconduct or more benign and straightforward fat finger errors, and erroneous trades.

Analyzing unstructured data — especially textual information coming from news, web, and communication data — **is a key area of focus of many AI solutions** and providers. Most players are focusing on processing unstructured data coming up with insights and meaning embedded in the data. **We are also seeing interesting cases of vendors developing natural language generation (NLG) capabilities to automate writing of standardizable reports**, such as SAR reports in AML. Figure 3 lists some of the AI, machine learning, and RPA techniques and their application in this space. These solutions are broadly helping in two ways:

- **RPA tools automate low-level knowledge work** — such as information extraction, aggregation, consolidation, workflow automation — that were traditionally done through manual efforts. This offers significant cost savings and efficiency improvement opportunities for banks using them.
- **AI and ML solutions can also support advanced analytics that offer superior insights** which is essential for conducting due diligence investigation and surveillance analysis.

Figure 3: AI-Based Tools and Their Benefits and Application in Compliance



Source: Celent

AI solutions can have high demand on infrastructure for data storage and computing capabilities. Therefore we are seeing judicious point based adoption in specific areas, such as name matching, link analysis, surveillance, and so on. **Cloud is being leveraged by many providers to offer ease and flexibility in running these applications.**

Cloud

Attitudes toward cloud adoption are changing drastically. Cost pressure, improved features, and regulatory clarity and even encouragement are paving the way for greater cloud adoption in compliance.

Moving to the cloud can offer numerous benefits as can be seen in Figure 4.

Figure 4: Moving to the Cloud Can Have Numerous Benefits

Variablization of cost	Elasticity, scalability, on-demand	Location independence	Standardization and centralization	Utilization efficiency
• Freeing up of resources for upfront investments • Converts fixed cost of operations to variable costs	• Faster time to market for new asset class, geography • Easy to adjust to variable volumes	• Access to memory, data, network on cloud from anywhere • Optimal location of servers, data centers	• Easier to integrate and streamline disparate processes and applications • Ease of agility in responding to changes	• Transparency in consumption and billing • Efficiency optimization by eliminating inefficient processes

Source: Celent

The recent shifts in banks' attitude to cloud are being driven by several factors:

- Many of the key regulations are now moving into implementation phase, **forcing firms to implement compliance solutions** — such as in surveillance, regulatory reporting, and in KYC-AML — **in a very short time**.
- Cost pressure is another significant driver; **firms are constrained to make heavy investments, especially in areas like compliance that are not considered differentiators**.
- Storage of large volume of data for reporting, as well as capacity to run advanced analytics leveraging AI at a low cost, require **flexibility and agility that only cloud can provide.**
- **Keeping pace with regulatory and market structure changes and translating them into systems are much easier in a cloud-hosted solution** than having to continuously adjust on-premise solutions.
- **Previous concerns about security issues involving cloud are waning** mainly due to improving security provisions of cloud providers and the growing recognition that cloud providers can invest in and manage security features better than individual banks. Clear regulatory guidelines and even endorsement around cloud usage in some jurisdictions are also making the journey to the cloud smoother.

Some jurisdictions continue to pose challenges relating to how data can be stored, and more importantly exchanged with others, but **overall we see fewer dark**

clouds when it comes to adoption. Even some of the regulators like FINRA in the US, and defense and intelligence organizations are using the public cloud, lowering the degree of discomfort banks have long had. When it comes to data sensitivity **we are seeing an interesting evolution in tiering of data**, with commoditized non-sensitive data being managed in the public cloud, while more sensitive customer and transaction data residing in-house or on private clouds.

Whenever there is a need to develop new solutions, we see cloud becoming the preferred choice, because it makes failure much cheaper and less risky. As banks are having to build new capabilities owing to upcoming regulations, we think the outlook is bright for cloud adoption.

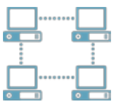
Cloud is also proving to be an enabler of multi-tenancy and shared service models, where banks are increasingly looking to share technology and operations among peers to reduce costs.

MUTUALIZATION

We see unprecedented levels of cooperation among banks to mutualize noncore activities, with many firms engaged in developing and using compliance and reporting solutions on a shared basis.

The theme of mutualization has intensified in the aftermath of financial crises. Especially in areas which are considered noncore and nondifferentiators for banks — such as post-trade operations, reference data management, regulatory reporting, risk, and compliance — banks are increasingly willing to not only outsource technology and operations but also to share them among peers, and even at an industry level, to drive down costs and improve efficiency.

Even within the compliance space, we are seeing mutualization initiatives being developed in a number of areas from KYC to regulatory reporting for regulations such as MiFID. **We are seeing unprecedented levels of cooperation among banks to mutualize noncore activities, and expect to see growing adoption of mutualized solutions in compliance.**



DISTRIBUTED LEDGER TECHNOLOGY

Distributed ledger technology (DLT) promises to be a force of disruption in different areas of financial services. We are seeing interesting use cases being developed in compliance, most notably in identity management and KYC.

DLT could alter practices in a number of areas. We are seeing developers building solutions in payment, securities issuance, clearing and settlement, depository services, proxy voting, etc. In the compliance space, identity management for KYC activities is an area where use cases are being developed.

These are still early days for DLT-based solutions, and a number of issues — in technology and operations, as well as regarding regulators' stance toward them — need to be sorted out before they can be turned into commercial solutions. We are seeing interesting partnerships among banks, solution providers, and startup companies in building such solutions.

INNOVATION IN COMPLIANCE TECHNOLOGY

***Key Research Question* 3**

Who are the providers of next-generation solutions in compliance?

An interesting combination of startup "RegTech" firms and incumbent providers is reshaping the compliance provider landscape, as banks increasingly look to partner rather than invest in developing in-house technology innovation.

The evolution in technology practices is giving rise to interesting development in the universe of providers of compliance solutions. **We are seeing a host of fintech startups entering this space,** so much so that the term RegTech has become part of common vocabulary to describe and distinguish such players from other fintech providers. Their rise is driven by two key factors:

- **Budget pressures have forced banks to mainly focus on run-the-bank programs leaving them with little time and resources to invest in innovative technology**. They are following a partnership-oriented approach with fintech providers, whereby banks impart domain expertise, regulatory knowhow, and even data sets to help startups test and develop new solutions.
- **On the provider side we see startup companies, former industry professionals, and vendors from other industries** (such as defense and intelligence, retail, online technology) **developing new solutions in compliance**.

Cloud cuts across the value chain; for startup providers public cloud is usually the preferred option because of its very low cost and high computing flexibility. **Incumbent service providers on the other hand have a preference for private and hybrid cloud** owing to greater focus on security issues.

This report anlayzes 11 vendor solutions that fall under the themes discussed in this report. There is a slight bias toward providers of solutions in KYC, AML, and vendors leveraging AI solutions, but this is largely reflexive of general market conditions where we see a lot of developments in KYC-AML due to heavy fines and regulatory scrutiny.

KYC/AML Solutions

Kofax Kapow

Themes: AI, Cloud

Robotic Process Automation in Compliance

A major pain point in banks' compliance operation is the need for high manual efforts to conduct low-level knowledge work — such as data collection, enrichment, and aggregation — for conducting due diligence. This is a key driver behind the exploding team size as well as costs of compliance in recent years. There is clearly a need for more process efficiency and automation at several stages within the compliance value chain, and banks are looking to use robotic process automation (RPA) tools to solve these challenges.

Founded in 2005, Kapow Software was acquired by Kofax in 2013, and as Kofax Kapow™ is a provider of RPA tools and bots. The company, particularly strong in deploying web bots, serves multiple industries such as banking and finance, logistics manufacturing, healthcare, and retail and travel, and has developed solutions for compliance monitoring and reporting for banks' KYC-AML operations.

The Kofax Kapow robotic process automation and integration platform builds and deploys intelligent robots that handle processing of information from many application and data sources, including websites, portals, desktop applications, and enterprise systems. The automated software robots can communicate bi-directionally across multiple channels without requiring APIs and complex integration coding. Key features of the solution include:

- Centralized server-based robot deployment and management with easy scalability.
- Robots automatically acquire and integrate data from websites, portals, and enterprise applications of all types (e.g., Windows, Java, Oracle, SAP). It has the capability to automate the extraction of text from an on-screen image.
- Robots authenticate against sites and web services using user ID/password, basic authentication, digital certificate with alerts, and historical record of every transaction.
- Lightweight business applications ("Kapplets") can be designed to execute robots based on set parameters or present data back to a business user.
- The Kapow Synthetic API technology enables wrapping an existing application and simulates API functionality without coding. It can deliver output data to business intelligence tools (such as Kofax Insight™, SAP Business Objects, Tableau, Qlik, and others) for automating further analysis.
- Interactive and customizable dashboards to monitor employee productivity and other key process elements.
- Can either be deployed as an on-premise enterprise deployment or provisioned in the cloud.
- Flexible usage license model versus a per robot model.

RPA in Compliance Monitoring and Reporting

Kofax Kapow robots are being used by banks to automate due diligence in KYC onboarding process. Kapow for compliance monitoring and reporting enables banks to automatically acquire, data from any source — websites, email, databases, applications, and spreadsheets — and enhance and deliver it to executive dashboards, Excel worksheets, and other compliance reporting tools.

This allows compliance analysts to automatically extract regulatory information and updates from a multitude of websites and portals. Specifically for KYC due diligence, banks typically look up several government, third party provided, and other lists to find presence of bad actors and entities. This often involves significant manual efforts by analysts to type in individual names and check for matches. Kapow robots automate this process by consolidating the several lists into a single data structure, so that a single query can be made for finding a match. Instead of checking individual names, a list of input names can be taken from bank's internal system, and the complete list can be automatically checked against the consolidated list, thereby automating the complete process. Search results could be copied and pasted automatically into a single document for further analysis. Kapow integrates audit trail information for regulatory purposes, and includes all information that might potentially fall under an audit.

In a specific implementation for a British global bank, Kapow robots capture regulatory information from over 300 public websites, including new rules, rule changes, and regulatory news — a task that was previously conducted manually by the banks' analysts. Another global financial institution has deployed Kapow robots to automatically gather information from over 40 internal and external sources to analyze potential exposure for reputational, operational and technological risks, saving hundreds of man-hours per month for the bank. The high potential of RPA tools to improve efficiency and save costs and time, and successful use cases such as these should pave the way for more adoption in the near term.

OUTLOOK

The level of adoption of the different themes and solutions differ.

- These are still early days for DLT-based solutions, and they still have some way to go before becoming full blown commercial offerings.
- Mutualization and utility initiatives are further ahead on the adoption curve, with concrete solutions being developed or already in operation in KYC, regulatory reporting, and adjacent areas.
- The last 12–18 months have seen proliferation of AI-based solutions with a number of banks either implementing or working with vendors to develop use cases and proofs of concept. Surveillance, KYC analysis, pattern and fraud analysis, automated report generation, and process automation are some of the use cases we have seen, and there are new cases emerging by the day.
- Even though cloud has been around for a while, its adoption in certain segments had been limited until the recent past. But we see dramatic shifts.in banks' attitude toward using cloud in risk and compliance operations.

The outlook for innovation in compliance technology and further adoption of these solutions is generally favorable. However, it would be prudent to keep in mind some of the common questions and concerns banks can have while considering the new models.

- **Impact on existing infrastructure is a common concern**, especially with radically different technology such as AI or DLT. Firms want to be mindful of not altering infrastructure too much while experimenting with new technology.
  - For this reason, we think adoption of point solutions for solving specific pain points is more likely in the near term, rather than overhauling complete operations.
- **Regulatory stance regarding the new solutions is another question** many banks have. Banks in particular are keen to understand how they can explain to regulators the underlying principles and logics used in analysis, especially while using AI-based solutions.
  - Working with vendors on proofs of concept using sample data sets can help answer some of these questions and allay banks' concerns before live implementation. Learning from peer institutions adopting similar solutions is another way of addressing such concerns.
- **For mutualization initiatives, governance issues around finding consensus, and building a highly standardized solution that will also cater to firm-specific needs, are the biggest areas of concern**.
  - Growing cost pressure is making many banks go the extra mile in finding an amicable solution to governance issues. For the technical challenge, providers are coming up with configurability options that allow banks to choose from a set of standardized options to cater to specific needs.

The challenges of dealing with rapid evolution in the regulatory environment in a cost-effective way are significant. This is pushing all participants — banks, incumbent and startup players, and regulators — to come together and foster innovation that solves today's challenges without jeopardizing safety and stability of institutions and markets. **We expect the pace of innovation in compliance technology will only accelerate**.

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