Deep Science Publishing
https://doi.org/10.70593/978-93-49910-98-0_11

DeepScience
Open Access Books

Chapter 11: Achieving cross-platform integration across wealth systems, digital banks, and cloud applications

11.1. Introduction

How can wealthanks? While digital banks can bring retail customers the power of wealth systems, such as financial planning and portfolio construction tools, bringing the strength of wealth management systems to the digital bank's retail customer base takes some doing. Although the first step is to offer investment capabilities in a digital bank, it is nowhere near the last. While there's much to learn about the requirements of full-featured wealth management infrastructure, digital banks, in particular, need to be digitally transforming their wealth management capabilities. Wealth systems are complex creatures. They serve wealth managers on one side while also serving the ultimate client on the other. Digital banks are set to disrupt wealth management, lowering the costs of execution, strategy, and advice for their retail customers (Morgan, 2020; Kumar & Patel, 2021; Lee & Nakamura, 2022).

Achieving cross-platform integration across wealth systems, digital banks, and cloud applications, however, is both time- and resource-intensive. Electronic trading has become commoditized, yet there still exist time and ownership concerns when it comes to ideas, allocations, and portfolio updates stemming from a lack of communication. Advisor technology has automated many aspects of the wealth management lifecycle from client onboarding through periodic reporting, but it could—and we argue should—be doing much more. Client, account, and trading data are being pulled among several platforms and applications, requiring reconciling and possibly reshaping. Quite simply, it is not enough for brokerages or wealth management systems to offer APIs for third parties to access their data, nor is it enough for digital banks to access only a subset of the data these platforms expose. This is only the beginning of the discussion; there are no doubt even more questions than there are answers (Zhang & Lee, 2022; Fernandes & Gupta, 2023).

11.2. Understanding Cross-Platform Integration

Achieving Cross-Platform Integration across Wealth Systems, Digital Banks, and Cloud Applications helps bridge the gaps between organizations involved in wealth management or digital banking, so requirements, products, market approaches, and customer experiences can be coordinated more closely. How cross-platform messaging flows can affect user experience and provide product and service support across management levels for issues like service types and transaction costs can be important to many stakeholders, like custodians, asset or wealth managers, investment platforms, digital banks, corporate banks, execution venues, market makers, securities clearing, and settlement organizations, or independent financial advisors. Cross-platform integration as it relates to wealth or corporate banking areas has, until recently, often centered on the digital bank's system or the local installer of integrations or transactions, such as securities clearing houses or settlement organizations. Relatively easy-to-access methods like file-based integrations using batch transfers are often involved. These frameworks can create limitations for all parties involved since they rely on similar proprietary integrations with limited control or visibility toward transaction timing and status. More recently, with the adoption of APIs, better integration capabilities have started to emerge, providing greater transparency and extensibility. But also, more complexity has arisen as asset or wealth managers try to expose functions at more levels within their organizations, preferably for wider-spectrum consumption across transaction processes or customer services. With the sophistication of customers and their demands for wider service access, often with lower informational barriers, but also more-targeted and faster solutions, the scrutiny on market capabilities has increased. Demands are focused on reducing not only transaction costs but also projected transaction delivery costs. This scrutiny impacts all parties involved, especially the primary interfaces that clients interact with regarding services and costs. Efficiency across channels is not just a question of whether you can provide direct connections through private APIs. It also is an issue of whether organizations can communicate efficiently across the various systems.

11.2.1. Definition and Importance

Cross-platform integration is the act of connecting various platforms to allow for the exchange of information within an organization. A platform can be defined as a primary technical resource, such as an organizational system of record, application, or service. Examples of platforms that cross-platform integrations could connect include application programming interfaces, enterprise resource planning systems, customer relationship management systems, application management systems, payment

processing applications, banks or credit unions, and commercial account opening platforms.

Simply put, cross-platform integration connects multiple company platforms so that all partners are able to send and receive information seamlessly. Cross-platform integrations typically send and receive information between systems, allowing for real-time visibility within either system. Many account opening systems and digital banks come pre-built with integrations to major banks. These allow customers to log in and verify their bank accounts or perform instant account verification as part of the account opening experience to create a single customer experience across platforms. Cross-platform integrations support the goal of companies within the wealth management arena to create a seamless and uninterrupted experience for their customers who utilize more than one type of financial services. These connections maximize the value of an organization's existing technical systems, including operational, business, and customer service systems. Cross-platform integrations support back-office efficiencies and satisfaction for digital banking institutions across the customer onboarding experience.

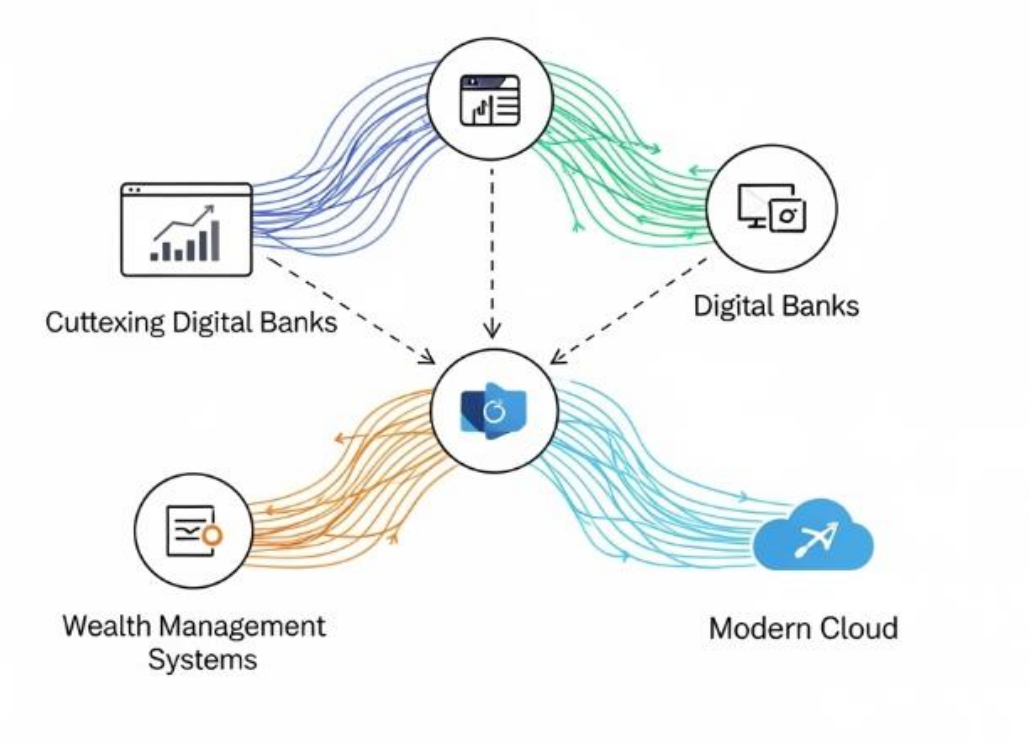

Fig 11.1: Digital Transformation in Banking

11.2.2. Challenges in Integration

The digital transformation of banks will challenge financial institutions' ability to innovate and launch new solutions and services quickly. While each vendor and service provider tries to integrate the next set of changes to their stack, integrating the portfolio of solutions across vendors and third parties is an even more complex task. While openness is a key requirement in the technology landscape, how can banks integrate the entire ecosystem? Technically, it requires the establishment of a backend API within the various core banking systems in the front and mid office systems. Building an API may be a large effort for legacy systems that were not designed with openness in mind. Thus, banks with legacy systems still face significant costs in integrating third-party vendors, negating the cost advantage of socialized development in the fintech world.

An example of a complex integration task in the banking world has been the integration of Investment and Wealth solutions into the existing core banking capabilities. Major systems vendors in those areas have built their own solutions, facing the same challenges in integration. Also, the solutions and service vendors in the digital bank ecosystem have similarly grown through acquisition, using the same resources to consolidate a strategy of deepening their product focus. Lastly, the requirements for integration are further brought into focus by banks now being invited into a number of general economic-shaping aspirations by their respective governments. With the growing challenges brought about by climate change, banks get tasked to offer more enlarged yet directed wholesale and retail options to cooperatives, religious interests, individual initiatives, and industrial enterprises.

11.3. Wealth Management Systems

Assets typically employ a stand-alone architecture. As a consequence, this leads to the major gaps that various players need to address for further wealth management purpose. How wealthy families would build their family enterprise when there is a gap with all other layers of the banking services – both from a practice and technology level. As their clients primarily belong to a wealthy class, banks would like to offer much more than traditional banking services. But, this is not about the clients; this is about the banks that run standalone transnational systems that create gaps between the various departments – both credit, transaction banking, equity, but also private equity and corporate advisory.

The enterprise architecture typically start at the branch level. As a consequence, when a foreign bank client just come to the branch in a given location of the world, he or she may not be at all recognisable. How can software policy and code policies on software design be architected so to allow the banks for cross-examination of the various steps in the clientele knowledge, upcoming soft data from services as well as getting the real-

time news for accounts created during his high-level information with the correspondence for this client? How to architect the help technology-wise so that the bank intend to lend, but also relation with the group across its various levels leverages when decision due diligence as well as privacy sectors that curb traditional wealth management advisory as its paramount to address both challenges if the family enterprise is to face a cycle change and still be able to focus on a subsidiary company or is an area of diversification of many layers in the market? Also, what system architecture lead to data-governance pitfalls and resources spent for re-organizational processes in the Institutional Security Advisory Groups of the Major Banks?

11.3.1. Overview of Wealth Systems

Wealth management systems represent a critical consideration for many global organizations, typically large financial institutions, global banks, or enterprise-scale systems integrators. Wealth systems are inherently complex, with a diverse set of varied global regions all contributing to market activity. Whether we are referring to financial products such as private wealth management, brokerage services, gifting, day-to-day banking, custody, or philanthropy, there are many "service cards" played in this affluent market. Wealth systems are also at the forefront of the rapidly evolving change in financial engineering and restructuring. One need only look to the emergence of digital banks and family offices, with their evolving marketplace for secondary liquidity and debt products. These solutions are often delivered via software as a service solutions, where niche vendors have emerged, catering to different market trends.

Wealth management is the highest-level financial dedicated consultative services available to individuals or families. Clients may rely on several different types of intermediary to accomplish their wealth planning objectives. Wealth services attempt to deliver significant simplicity to ultra-high-net-worth individuals in managing their complex series of financial-related issues. Configuring these services within a global ecosystem of third-party boutique solutions can be complex for both the wealth systems and their clients, especially in light of the implications of information governance and risk regulation. Intermediaries require specialized and highly expensive consulting services to optimize these processes since ultra-high-net-worth clients restrict a very small number of funds for their investing requirements. Combined with the implications of aging on the remaining wealth transfer – families and family offices have a substantive potential for wealth transfer over the next ten years – there are significant policy, strategic, and service opportunities for wealth systems and their clients.

11.3.2. Key Features and Functionality

Although wealth management systems across vendors have some variations in functionality, typically, they provide a similar set of key features and functionality. These core capabilities are designed to provide significant benefits such as reducing time and cost; improving adviser sales and service productivity; increasing customer satisfaction; decreasing payments processing risk; improving accounting; better meeting regulatory compliance; supporting better investment performance; delivering broader product offerings; and increasing accountability and governance. Front Office Capability On the front office side, wealth systems typically offer – or integrate with – portfolio management tools for customer segments that have a high degree of active trading; trading tools such as order management systems; sales and service capability such as customer relationship management; client online interactive portals and educational resources; office communications tools; compliance oversight; and performance measurement. Middle and Back Office Capability In addition to core services such as client onboarding, account opening, and payments processing, wealth management systems typically provide other services that enable financial advisers to spend less time on the transactional activities related to customer accounts and portfolios. These services include account activity inquiries, account maintenance, and transaction processing; accounting; compliance; product offerings and selling tools; product pricing; reference data; reporting; settlements; technology and product infrastructure; and portfolio management supported through transactions, accounting, and reporting.

11.3.3. Integration Needs

Integration is the watchword with this next asset class, wealth management. There are two aspects to this. First, we are seeing the increasing democratization of investment in wealth-creating assets such as shares, bonds, and property through the advent of global fintechs to give mainstream investors access to easy-to-use investment capabilities through self-service digital apps. The recent emergence of so-called neobrokers on every street corner are revamping the storefront window for share-dealing. However, you only need to look at the list of banks on this platform to see how these new entrants have partnered with technology providers to really scale-up. While banks still look upon some of these new entrants as competitors, we are clearly seeing a shift towards cooperation.

This leads onto the second aspect and that is that, unlike probably most other areas in banking, investment capabilities have lagged behind. Outdated wealth management technology is introducing significant friction into the market and long-standing supplier relationships between investment banks and their partners mean that legacy vendors—who often lack the innovation to service the emerging needs—dominate. This is clear in every area of investing from planning through to execution, tax optimization and

reporting. Add to this that traditional wealth managers are facing unprecedented levels of disruption—from robo-advisors, asset managers, peer-to-peer lenders, new clearing brokerages, digital trading venues, aggressive hedge funds, and code-based algorithms, their primary focus remains on clients. Those clients expect a consistent experience, whether they are talking to their wealth planner, investing through their mobile phone, or managing their retirement fund online. The best financial institutions already partner to provide. Managing a million-dollar portfolio does not preclude someone from also wanting to borrow $100,000 or insure themselves with life or health cover.

11.4. Digital Banking Landscape

The landscape of digital banking is populated by quite a broad set of organizations and brands. What was once the industry of "banks" has evolved into a set of virtual brands organized primarily on cost, flexibility, and the product set each brand takes to market. From the parent banks who operate under all the regulatory jurisdictional constraints and have massive branch networks, to nimble "Neobanks" that cater to specific customer niches. From full-service retail banks that host complete online-only or partial mobile apps and call-centers that are bolted on to real banking infrastructures, to the ISVs that are built from alternative principles that appeal to millennials fed up with traditional financial services or need a banking capability "baked-in" to an eCommerce or Travel experience. While these browser, app, or SDK at the "front-end", our organizational units of Choice and Availability may shift with how digital consumers associate with characteristics of banks, that differentiation does not alleviate the challenges of maintaining a secure vault, a full transaction service capability. Sure, "branch suppression" does shift cost away from the traditional network model, substituting more and deeper online service interactions, but digital banks are still banks at their foundation.

Despite the breadth of their operational styles, digital banks share many of the same requirements to host their Core Banking Services. Manual bank operations are typically run on mainframes. Banking services often consolidate many of the complex transactions associated with branch and backend processing such as payments, credit control, cash asset accounting, loan origination, and deposit accounting services. While these devices have served their purpose and continue to be reliable, update cycles are both expensive and difficult, since many of the budgetary financials are used to predict when a refresh cycle might occur.

11.4.1. Evolution of Digital Banks

Digital services are increasingly becoming an essential distribution channel for banks and other financial institutions to attract and retain customers. More recently, enterprise approaches, involving shared, common services providing a holistic customer journey across all channels, have gained traction, causing the institution's core to shift from targeting individual products toward the customer who utilizes related service offerings. These changes challenge the notion that each of these sectors will always need unique IT services and pave the way for the rise of shared multi-tenant common banking services.

The core is also shifting from domestic operations using localized IT services to multinational multi-entity operations utilizing cross-border cloud services from few leading providers. Banks are already exploiting the infrastructure cloud and are in various stages of utilizing IT cloud services. Digital banking infrastructures may soon be sought after by non-domiciled players. The lure of bypassing local banking regulation is leading expenditure banks to actively seek outsized global market shares and increasingly significant local customer footfalls. The increasing demand for digital services, and heightened competition from both incumbent organizations and new entrants have compelled banks to invest huge sums to renovate their core banking infrastructure, seeking to modernize. The ultimate target—don't go shopping for a new core; build a new core or buy a mortgage- and payment-only core and bring back the bank.

11.4.2. Core Banking Systems

The high-level connectivity of services in the cloud world is vastly different from the identity experiences available in traditional core banking systems. The offerings provided by traditional core providers have been focused on security, reliability, and compliance over experience and convenience. Built on top of legacy technologies and business infrastructure, developing custom experiences on top of traditional core banking services has not been possible. Digital banks take short-cuts to vary customer experiences, a route that is fraught with risks and compliance issues. Cloud banking platforms have been built on modern cloud-native technology stacks and are focused on security, compliance, reliability, and experience. Their offerings cross the spectrum of banking decisions, acting as a custodian of client security and private data while facilitating customer experiences, like e-commerce platforms, travel services, fintech partners, and more. These offerings believe in acting as business enablers and customer satisfaction partners rather than gatekeepers of the banking process.

Adoption of cloud banking platforms helps retail banks, the manufacturers of banking products like current accounts, savings accounts, payment options, wealth management solutions, loans, mortgage, etc excited to take their products to customers but hindered by high-cost points, extreme reliance on physical service locations in the economy, a plethora of centralized brick and mortar locations in the economy, cost points that help control product pricing but don't allow giving focus on exceptional customer experience. Adoption of cloud banking speeds the ability to launch banking products, faster, cheaper, and with the control and ownership of the digital experience by the banks.

11.4.3. Integration with Wealth Management

Digital banks are typically vanilla banks, focused on the basics of opening deposit accounts and executing loan applications. However, many want to go bigger by introducing their customers to a world of wealth management services. Digital banks are not wealth managers, so they are hesitant to, or cannot, build the systems and deploy the expertise internally, even though they could earn extra fees from their deposit customers for those services. Over the last few years, some firms have pioneered the remote delivery of wealth management services. Drive-in operators have found a market for "advisor as fiduciary" platforms at affordable price points. They have figured out how to provide wealth management services for the young to middle-age mass affluent at a price their clients will accept. They have the required remote, collective knowledge and advice expertise, tested technology, and operating infrastructure. These firms bring the discipline and focus that wealth drivers seek.

The driving factors in these changes are the decreasing need to be physical and the disintermediation of relationship brokers. Changes to the pricing structure for fragmented wealth management, as well as technological barriers for locating and advising small investors, are going away. As we have seen, deposit clients do not mind remote delivery if it reduces their costs. The result is the emergence of cooperation relationships between digital banks and drive-in wealth management providers, assisting one another for mutual benefit, and making customer satisfaction their primary goal. The aim of these partnerships goes far deeper than the more commonsensical co-branded marketing arrangements between traditional banks and third-party financial services providers. The objects of their combination are service fallback and completeness.

11.5. Cloud Applications in Finance

Financial service companies are embracing cloud technologies and cloud solutions, looking to create operational efficiencies through lower costs, reduce redundancies in supplier and service provider stacks, and invest in automating capabilities in a cloud-

native way. The financial services industry faces increased funding pressures but must create operational scaling efficiencies to help the broader digital economy grow faster. Cloud solutions are horizontally embedded throughout the value chain, spanning data movement, data accessibility, product development, and using financial services in a regulatory-compliant way on cloud-native infrastructure. No technology shift can move as fast as demand for solutions, and compliance with open, secure connectivity between solutions on multiple clouds rapidly creates rich and highly sticky vertical industry solutions. The last five years have seen radical changes across the financial services landscape, demanding new approaches to infrastructure, tools, and processes for innovation and development. Business partners across insurance, investment banking, investment management, and commercial banks are constantly looking to use cloud to accelerate delivery of new products to the market, simplify deployment/management of a complex solutions stack, and leverage an explosion of new data and new data sources to meet evolving customer preferences. To meet these objectives, companies are looking to build a cloud-based foundation for the services they provide and the way they provide them. This means entrusting their most critical and complex functions, such as market risk, liquidity risk, fraud detection, counterparty credit risk, and compliance services, to the public cloud. In addition, companies are rapidly developing and putting into production custom applications built on these functions such as regulatory reporting services, submission services, robust and tailored electronic trading interfaces, and real-time payment, accounting, and reconciliations tools.

11.5.1. Benefits of Cloud Solutions

Cloud computing is one of the most developing technologies that provide a number of affordable options that allow businesses to shift away from costly infrastructure or hardware expenditure. Cloud computing provides speedy growth and delivery of solutions that require better flexibility and adequate economies of scale for finance organizations. These are generally offered with a pay-per-use model. Businesses are freeing up their internal IT resources to concentrate on supporting their industrial application development and deployment. Companies are drastically reducing the costs and risk exposure of internal IT that deals with the mundane tasks associated with large and complex mission-critical industrial applications. For many businesses, the speed with which cloud computing allows them to deploy new services far outweighs the risks. The result has been the fastest growth in IT spending on record and for many organizations. It has allowed them to invest in technology that has had an immediate impact on revenue generation and profitability. The impact is felt across key performance indicators. Growth and profitability measures are enhanced by the deployment of new applications at lower relative cost; and employee effectiveness measures benefit from more direct interaction with customers through newer, faster,

focused applications. The IT organization is measured against fewer bottom line performance measures; and indeed, as cloud has become more dominant, many technology analysts question the relevance of IT productivity measures such as those comparing IT expenditure as a fraction of company revenue, and the internal allocation of IT budgets against service level agreements.

Fig 11.2: Finacle on Cloud

11.5.2. Popular Cloud Applications

Credit and risk scoring has been at the center of most banking applications. Starting with providing credit and knowing your customers, banks have been providing industry- and company-specific research reports, increasingly supported by big data, IoT, and now artificial intelligence techniques. Some of the industry-research cloud applications include various platforms. For project management, users have a choice of cloud applications available from multiple providers. Digital banks tend to focus mainly on mobile applications for payments, deposits, withdrawals, and money transfer, with wealth management and protection solutions designed separately driven by different platforms. Generally, consumer cloud banking applications tend to use third-party rejigs

of flat fintech connectors for account information. Even with national and international payment orchestration services, there are new digital banks offering these as services but currently configured for only limited transactions. For wealth systems, enterprises have chosen applications from globally well-known suppliers. These have been powered by the relaxation of investment services directives for financial institutions and may lead to larger-scale hybrid plug-and-play solutions being offered to also include national security depositories. For less complex wealth requirements, less well-known solutions have to be integrated with back-office partner solutions.

11.5.3. Security Considerations

No matter what, security is always a concern in the FinTech space, and security will always be more stringent in Wealth Management. Cloud-based applications are accessed publicly over the Internet, where a needed level of protection is to use a strong password, data at rest and in transit must be encrypted, user identity verification must be done at logon, accounts should be monitored for unusual activity, etc. In addition, the cloud app, being a 3rd-party app accessed via APIs, can pose a much larger risk for multiple firms at a time. Although safeguards created by cloud app developers and deployers have been put in place to minimize risk, potential vulnerabilities still exist. Cloud provider breaks to gain access to cloud data without authorization are always in the news, and having wealth client data leaked can jeopardize the future of a Wealth Management firm. Therefore, security must be assessed for both inner and outer walls used to provide protection.

It is critically important that data from the financial services domain be highly protected. Knowing that, protecting wealth client investment data must be done with an incredibly high level of encryption. Data at rest in the cloud application must be strongly encrypted using a difficult-to-crack algorithm. Data in transit to/from the cloud app should also be encrypted during leaving the office time and transit travel time across the Internet. Verifying user identity at the browser logon to the cloud app must be done; a multi-factor authentication process or the use of biometric verification can accomplish this. The financial services domain has rules created to ensure physical, administrative, and technical safeguards are put in place to provide as much data protection as possible. All involved in wealth management firms must consider cloud apps as partners, ensuring the cloud data is not exposed.

11.6. Frameworks for Integration

Integrating cloud-based consumer-oriented applications with traditional enterprise systems is generally a more complicated challenge than integrating applications that are

hosted in a homogeneous environment. Support for integration can occur at various levels in a software architecture stack, including application development frameworks, middleware solutions, and database synchronization techniques. The important point throughout any discussion of integration techniques is that no single technique is an end-to-end solution; virtually all approaches require application developers to write some custom code.

APIs and Microservices Service-Oriented Architecture is an architecture pattern that promotes coupled enterprise-level integration through the availability of common services that different enterprise systems can share, using standard protocols to communicate. For some years now, many companies have been adopting a more agile implementation of SOA, generally referred to as Microservices Architecture. With microservices, resources are, in effect, architected as a group of microservices, and custom APIs for accessing services offered by microservices are created and documented in a microservice catalog. Barriers between corporate departments or business units are broken in favor of informal partnerships across boundaries.

It is important to note that while an application service interface allows developers to extract or manipulate data from a system and could be considered a form of integration, this technically is not middleware. This type of integration is one capability that can be assisted by APIs or industry-standard data distribution protocols built into cloud-based applications but are not solutions that are provided in isolation by vendor middleware products.

11.6.1. APIs and Microservices

APIs (Application Programming Interfaces) and microservices provide a lightweight and flexible approach for integrating different components of a wealth management ecosystem. Microservices are componentized applications designed to be independently deployed and managed, each performing a single function and communicating via APIs using standard protocols. APIs can be considered the building blocks of any digital ecosystem. Service providers publish APIs defining how their services work, with a common authentication mechanism. Digital banks, third-party wealth service providers, and their partners then use these APIs for integrating their systems.

Microservices let organizations share innovation and enable businesses to be at the forefront of industry change. For banks, investment managers, or fintech wealth start-ups aiming to digitize and monetize their service ecosystem, APIs are a shortcut for tapping into each other’s unique competencies. APIs help accelerate the onboarding of new partners, accelerating time to market for new offerings and enhancing the customer experience. Financial institutions with the right API strategy can create a dynamic and

fluid architecture, implementing only solutions for which they hold relevant internal competencies. Moreover, API-first enterprises have created systems that deliver technological innovation from their technology stack, enabling differentiation in their services.

An example of an API-based digital banking and payments ecosystem is the recently launched Banking-as-a-Service APIs available from a UK-based fintech. The company is working with fintechs and other companies, which is enabling SMEs to provide digital financial services to their customers via a federated banking distribution model using these APIs, and which is enabling businesses to offer digital banking and payments via its Banking-as-a-Service platform that exposes the same APIs. Another example is the API program launched targeting digital fintech companies and other innovators. Other banks have established developer portals in their websites for sourcing third-party applications.

11.6.2. Middleware Solutions

Middleware is one of the solutions proposed to solve some of the integration issues. Middleware is valuable for banks because it can abstract away the low-level communications, session establishment, failure recovery, re-transmission, and shared memory issues that the client application developers must otherwise face. In other words, middleware hides the details of distributed computing. The distributed development process, without the middleware, is difficult due to the dependencies between the applications in a client-server configuration. Dependent clients can be difficult to keep stable. For instance, when a customer places a holiday order, the mail-order company must query the airline. If the query temporarily fails, the response must be delayed until the query is successful. The customer cannot be expected to wait. Middleware can allow the order-processing application to continue without referencing the information from the airline until it is available, thus shielding the client from the server's dependency. When a client application becomes dependent on the results from another non-targeted transaction, random impacts can occur. These impacts occur in a variety of ways, depending on the primary database location, the salience of the secondary database update activity, and the timing.

Middleware systems are often implemented through a couple of kinds of designs. The first is to act as a software common data manager that speaks the computer language and protocol of an application programming interface. The second method is to act internally on behalf of an application and to appear externally as a human user. A proprietary gateway usually built to function this way accepts commands on a line-by-line basis, carrying out an individual action and then returning control to the next logical unique point in each application, rather than taking the application on as a whole.

11.6.3. Data Synchronization Techniques

The enterprise data synchronization, also called data replication, data propagation, or data distribution, is the creation and maintenance of a consistent set of data from multiple data sources including Public and Private Cloud Applications. The data synchronization can be achieved using various enterprise integration frameworks. Generally, three main data synchronization categories touch on all methods of data replication, including data propagation, complete transfer, transactional consistency, and multi-mode data transfer. These categories are logically grouped into static synchronization and active synchronization. The static synchronization will create copies of the files and then format translate them without consideration of data security and change notification, but the active synchronization constantly maintains the copies of the data up-to-date by listening for file changes. The static data synchronization is mostly used for importing data from disparate enterprise systems into a data warehouse, business intelligence system, or mobile workforce application where the older data will typically suffice. The active data synchronization is typically used to support those consumer, B2B, and enterprise applications in which the data needs to be accurately and instantly transferred and maintained in a secure and reliable manner.

Depending on the integration technologies and connectivity type utilized to implement the data synchronization, the data propagation can be classified into four types: email transport for simple data propagation, middleware for flexible data propagation, ETL/EBM solution for bulk data propagation, and application-aware method for trusted data propagation. The middleware-based data propagation approach can be on-demand file synchronization, application virtualization for trusted data propagation, and active data synchronization. Centralized email auto forwarding is a simple method for data synchronization based on the email infrastructure. The flexibility offered by the use of middleware for data replication is based on the sophisticated translation, channel, and routing capabilities available in the middleware solutions. However, these middleware solutions only support standard industry applications, electronic customer databases, customer relationship management applications, and industry standard transport protocol implementations.

11.7. Case Studies

One bank has achieved cross-platform integration with a cloud wealth management provider. Since 2016, it has offered high-net-worth clients a complete suite of wealth services, including investment brokerage and insurance products, in an integrated digital banking experience. The bank partners with the cloud provider to provide the wealth services technology capabilities. The integration capabilities the bank utilizes are "similarity based" – nearly all customer service, transactional, and managed service

functions are performed in the bank’s core digital banking package. Through API calls, the providers respond to requests for market data and research, and to execute investment and insurance product purchases. The bank’s customers place Requests For Proposals on the bank’s systems. However, the provider has the lead within the integrated user experience when subsequent investment management or insurance claim service steps are performed.

Both the bank's well-proven combination of traditional banking products, including mortgages and auto loans, with the cloud firm’s wealth products, and the providers’ trust in the bank's easy to use, full-featured financial dashboards encourage customers to build relationships that engage with both banks and advisors. The guidelines for success from these and other bank-cloud provider partnerships are: a trusted bank brand can build successful integrated relationships with customers through easily understood APIs, similarity-based process design, a full range of customer service functions residing in the bank's systems, a collaborative, integrated problem-solving customer relationship management process, and creating entry points focusing on bank services for joint wealth provider partnerships. This is driven by a trusted bank relationship built over several decades, and the fact that the successful asset-based pricing banks impose on wealth managers profit margins, lead to competitive price pressures to create customers.

11.7.1. Successful Integrations

Existing systems have faced obstacles and delays delivering effective implementations and support of new capabilities. Wealth and digital banking is complex enough. New services like integration of wealth backgrounds, tax, or third-party investment marketplaces, as well as delivery channels like chatbots or smart devices, require smooth communication between digital bank, wealth, and third-party provider systems. Adding new systems forces doing new plumbing. It may require changes to the bank's mother systems; it always takes time to ensure multiple systems are avoiding issues like bad wire requests or service outages. Operational due diligence is key to managing cost versus capability for wealth digitalization among multiple providers, and across existing or new platforms. Despite these hurdles, some organizations have successfully enabled cross-system integration to offer better client experiences. Informed, adaptable organizations are more likely to find sensible routes over or through the roadblocks. For example, a large global bank has used messaging APIs to implement an account opening and funding solution that seamlessly unifies its wealth management system and retail banking account opening systems. By confirming that a client's wealth profile met pre-conditions, the wealth system broadcasts an account opening alert over APIs that cross into the retail bank. This addition to the retail system allows the client and banker to fill out a single application, at which point the wealth system is automatically notified to

approve it. After the ID checks, the client is presented the auto-approved choice. A similar API utility allows clients to link investment accounts to bank funding accounts immediately upon account funding.

11.7.2. Lessons Learned

This chapter provided detailed accounts of wealth management integration for three very different-sized wealth systems used by independent RIAs. There are some similarities in these three integrations and some lessons learned that are common among them.

Any integration of a traditional wealth system will demand adoption of some technical standards for securely moving data to or from the cloud API involved. Without that specification, the chances of finding some custom setting that is needed to enable a secure connection are zero. The wealth system vendor needs to address high-level security matters, such as ensuring that data is properly encrypted during transfer and whether or not the various queries, requests, updates, insertions, deletions, etc. will be allowed through that secure access. The vendor must also document all commands available for making use of the API. The wealth data system is a centralized database hub that serves all of the wealth manager's clients, so the security concerns are amplified.

Similarly, the same API must remain unchanged for a significant time, with advance notice provided for changes, particularly if the API has any high-level biases in favor of certain APIs. An additional, not unrelated lesson is that wealth systems are not just simply cloud-based functions that can be offered as products without extensive customization. The cloud apps involved in these ten different integrations offer different combinations of functions, so they don't all have identical capabilities.

11.8. Best Practices for Cross-Platform Integration

According to the previously mentioned literature and research, several best practices can be identified when it comes to cross-platform integration. These address key concerns such as planning, testing, validation, and continuous improvement. Applying these lessons learned from practical experience with actual production integrations should serve to expedite the delivery of a responsive, secure, and performant cross-platform solution. Achieving cross-system integration is much more complicated than simply defining a consistent data model and then exchanging documents that represent an instance of that model. Not only must the involved systems be carefully mapped and understood, but business rules and workflows equally need to be accounted for. Integration strategy usually triggers major decisions both at a short-term operational level, about what projects to execute in which order and how, and at a long-term strategic

level, regarding what architecture to establish and which tools to adopt and adapt. Some of these decisions and plans tend to be rather obvious, such as "how soon is it necessary to integrate two systems that are to be kept as separate islands for X months/years before the marketing department will blow a safety fuse." Others may not seem as easy to discern in advance, e.g. "what scenarios for integration must the roadmap address". Analytically-based planning and strategy can serve as a solid foundation to guide the choices being made at every level along the journey, as soon as full strategic and tactical guidance is available.

11.8.1. Planning and Strategy

Achieving a better technology integration for your different wealth platforms and tools, and accelerating product distribution based on a world-class client experience with advertising marketing initiatives is not simple. The actual cutting-edge innovation shortens product lifecycles, and any miss is fast punished. Moreover, the competition for launching new services to customers is fierce and the customers are not patient. New entrants from free stock brokers or from robos for systematic investors are eating blood from private bankers who have never been consecrated to give money consulting or high value-added services. The push and pull come from all ends, all channels and are transversal to companies and customers' needs. Consequently, the final answer cannot be found by an isolated department because it will be unproductive. Transforming this diversity into synergy is always the solution, and technology creatively conceived, designed and implemented can be a very strong enabler of Business & Strategy.

An efficient investment fund is world-class integrated and automated along the customer journey. It should consider all aspects impacting the life cycle of investment products, from the idea of creation by Portfolio Managers, to their automatic and continued marketing and sale across various channels by supervisory staff and commercial partners, just as the total exposure to these particular assets and the complete accounting and tax reporting by clients, tax consultants and tax authority as well. This synchronous view of the product value chain, that is not only financial, avoids mistakes that can be found over any aspect and moment of its implementation: commercialization, distribution, costing, operations, reporting or judiciary.

11.8.2. Testing and Validation

Testing and validation are critical components of any cross-platform integration project for multiple reasons. The potential impact from a failure, where a missing or incorrect integration has financial or reputational consequences, are high. The speed at which integrations change and their interdependency with the systems or processes they link

create a need for consistent, tested, and validated deployments of changes. Lastly, in the development process, it is the channel between the business and the IT teams, clarifying and validating the initial upstream requirements and the downstream resolution.

The first aspect of testing to consider is the level of testing needed and applicable types of test. With many integration points established across the breadth of operations, a full-scale test of every transfer or return value across all relevant stakeholders is impossible, but a targeted process is a useful approach. Automated testing tools and processes are a useful way of validating specific channels, but in particular, types of systems, batch processors. In these systems, files or feeds are dropped into a designated area and subsequently picked up, processed, and returned. Many types of integrations fall into this category. Depending on the agency that will maintain them going forward, there are available options for both no- and low-code automated testing available. These tools will conduct basic validation functions of cross-referenced data items and as well assist with the bulk "sanity" checks that sometimes accompany regular changes, for example, import/export annualized frequency, aggregate vs. non-aggregate values.

Validating and keeping track of these types of tests can become difficult without a comprehensive strategy. They can become both time-intensive and often lack financial justification based on the severity of possible negative consequences vs. effect of under-testing. However, because of the complexities of the financial systems and the connectedness of many of the systems, businesses often have to accept the risk of going without. Depending on the process under review and its importance, the best approach may also be to coordinate efforts with the IT group to time the test to run after or close to the expected occurrence.

11.8.3. Continuous Improvement

Continuous improvement, often driven by Agile principles, can be used to generate roadmaps for future functionality or minor technology changes. This is a shallow but wide model of integration that recognizes a few specialized connectors, ideally hosted inside log-in modules of larger applications that allow clients to manage key mappings themselves. This makes the model easier to "sell" to customers. A more complex but deeper implementation would have a diverse set of "deep" APIs and services behind the style-governed UI management console or private application portal.

No single product or vendor will be able to meet all use cases, so some diversity in capability will be welcomed. The benefit for clients of a shallow model is speed and risk management of early implementations. For major integrations or when integration is part of a wider digital transformation, including reengineering core applications on the digitized journey, preceding this collaborative, shallow phase with robust connectors and

APIs and services to perform deep integrations would spread risk and timing for the more ambitious initiatives. For the more ambitious deep integration scenarios you will return to using a combination of application-specific connectors, general-purpose connectors, and low-cost permanent bridges. This requires an understanding of both the content and purposes of the connection and the tradeoffs between the cost/complexity of each approach. The major change mechanism will be to recognize that real-time triggers for workflows will not be limited to events occurring inside applications. Events occurring on the edge of the enterprise will be as important. And software development must also begin to accommodate the semi-structured data that events on the edges create.

11.9. Future Trends in Financial Integration

In the spirit of forward-thinking, the patterns illustrated in the prior sections of this chapter point to several predictions for the future of cross-platform integration across the burgeoning physical and digital eco-systems around wealth management, banking, and commerce. The primary drivers of these predictions include the accelerating speed of technology development, the drive for financial institutions to achieve economies of scale in the wake of the Great Recession, expectations for increasing regulation of operations and mobile technology interfaces, predictions of high demand and rapid growth of wireless payment capabilities and products, and heightened consumer expectations for simplicity, ease of use, and cost. As a consequence, digital and mobile seamlessly-enabled payment, transaction, and communications platforms are poised to emerge as the central interface for the global eco-systems of banking, especially in rapidly-growing emerging economies that have been underserved by traditional banking and wealth management.

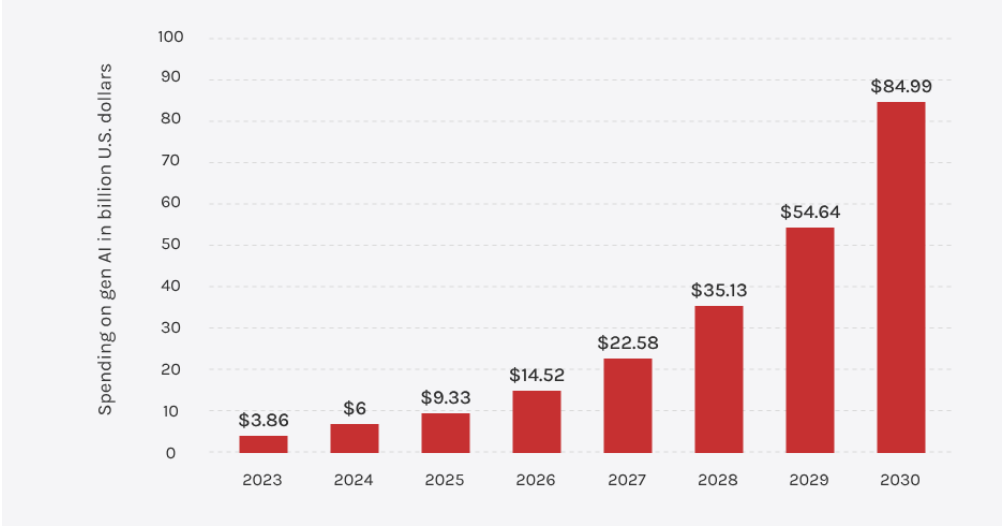

Fig : Digital banking trends and future outlook

As transaction and data security issues around money move to center stage, innovation in regulation, compliance capabilities, and financial industry cybersecurity will develop in tandem with innovations around transaction capability, privacy, and data protection. As these changes occur, banks and credit card companies that have traditionally maintained control of money movement and transaction security may find some of the ground shifted from under them. In a very natural counterbalance, as civil libertarians warn against government domain mandates, the pressure for more regulation, compliance, and active protection of operations and data privacy is also predicted to ramp up. The point is that the differently-interested reactions on the part of both the public and private sectors will likely continue to influence the wealth management, banking, and mobile technologies ecosystem for the foreseeable future.

11.9.1. Emerging Technologies

The era of universal banking and monetary policy have had a significant impact in reducing gaps in opportunities offered by banks. This, along with technological innovations, helped to expedite the process of financial access and inclusion by allowing the banks to serve the transitioned areas, hitherto little catered to by the branch networks. Banks are using various forms of technology and technology based initiatives not only to remain competitive but also to expand into the higher market segments. Emerging technologies are the driving force behind this transformation. From the technology point of view, a number of advances have been made that help banks stay close to their customers at a fraction of costs, thus offering tailored products to the upper but unbanked and underbanked segments. The spread of the Internet has permitted banks to place a mortgage product and conduct transactions online. This has lowered costs but has also improved consumer welfare as mortgage processes have become simpler, less cumbersome and more transparent. With technology banks are able to better manage and more precisely price the risk of lending to the more affluent but unbanked customers via a system of sorting, analyzing, pricing and monitoring the operations on various types of accounts. The successful application of technology permits companies to enter into direct competition with banks, sometimes by making available new loan and payment facilities, product redesign to cater to specific needs, especially for remittances, at low costs.

11.9.2. Regulatory Impacts

Any company seeking to offer investment products or services to US investors is subject to rigorous regulation. Often, a foreign-based broker-dealer willing to submit to scrutiny of service offerings and advertising messages may accept orders placed by US investors

seeking to swap currency or settle stock transactions through that broker-dealer. Banks offering online services from non-jurisdictions must exercise care to see that they do not reach regulated investors through those services, because these services presumably would have to include approved or registered terms. Curiously, many US firms offer electronic access to foreign investment accounts without suffering regulatory consequences or restrictions. However, many foreign-based bank systems, particularly Japanese banks, offer services and permit investment transactions on days when the US markets are mutually closed, which bypasses US regulations.

While many see this currency trading ability as an end in itself, it is only an illustration of the inefficiencies of globally integrated markets that continues to elaborate lucrative but risky interchange transactions. More importantly, the accounting and taxation treatment of cross-border forex transactions influences the effect of variable exchange rates on reported earnings. Current rules treat taxation of gains on currency transactions under normal gain rules for sales of other property if a foreign currency is held for more than one year, or as ordinary gains if the currency is held at the time of money determination. Taxpayers must account for these transactions using the "true" or functional currency rules.

11.10. Conclusion

The growth of Digital Banks gives Wealth Management Services the chance to make a difference and be compensated for dealing with all areas of clients' lives. Digital Banks have not typically been good at accepting HNW individuals. They do, however, recruit actively entrepreneurs who later make money and want to deposit it somewhere. These entrepreneurs could be a target for partnerships. The partnership could be in a "jumping the cliff" model – Digital Bank accepts the HNW entrepreneur until an established Wealth Management business says the opposite, or a "where you belong" model – Digital Bank collaborates with Wealth Manager to develop a customized discounted offering, which is attractive enough for the entrepreneur to stay a bit longer with the Digital Bank. In both cases, the Wealth Management business is a win-back plan. These are for banks focused on business Banking. Banks focused on retail Banking do not seem to be good partners. They are US-based, and wealth management is not actively promoted across the Atlantic, because of different taxation on wealth.

Tuition is relatively easy. Cross-Platform Integration is what Wealth Management needs to find a partner and develop the Wealth & Leisure Relationship. Technology companies speak about it, as it is the technology support for "one summary number". Only Intelligent Web Services that are really integrated, "embedded" into where Clients do their Banking, Travel and Life Planning, satisfy the need for Client-centric presentation. To achieve Client-Centric Banking, banks have two options; either develop some "all

payment-centric" technology that gives Clients a summary Bank Accounts Summary or accept some partner Intelligent Web Services and make them embedded in Banking Platforms to give Clients a summary number; probably much more than Banks can offer. The second option is, of course, the easiest with the biggest Client Benefit systems help digital b.

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