Deep Science Publishing
https://doi.org/10.70593/978-93-49910-62-1 _8

DeepScience
Open Access Books

Chapter 8: Transforming back-office banking operations through end-to-end intelligent process automation

8.1. Introduction

Large-scale banking operations frequently struggle with inefficiencies in back-office processes, as they often depend on disjointed components that require thorough manual involvement to provide the vital document verification that upholds compliance. Repetitive, rules-based jobs sap employee drive and suffer from on-the-job fatigue that can breed errors and system failure.

Over the past few years, banks have started deploying exclusive solutions that automate sections of the underlying processes, such as robotic process automation to electronically handle document transport tasks, data extraction projects to read physical documents, algorithmic tools to match data from documents to internal records, and projects to swiftly move transactions and access immutable data. However, solutions remain separate, with subsections still requiring manual activity (Hasan Chy, 2024; Kovacevic et al., 2024; Bhattacharyya et al., 2025).

Intelligent Process Automation integrates process components with end-to-end process orchestration. It enables tools to transmit tasks from one IPA platform system to another and allows for the intelligent use of AI and algorithmic tools to select the best solution for a given task, as well as the use of advanced platforms that allow the design of process sections absent the custom coding that limits the flexibility of IPA. Designing an end-to-end automated process using IPA dramatically cuts the cost and time of full automation compared to the alternatives that banks have deployed. This synthesis also helps make IPA accessible to nontechnical business domain experts.

Scope of back-office operations: In the case of banks, these operations include inter-branch and inter-bank reconciliation of funds and transactions, treasury and other transactions settlements with banks, cashiering branch – reconciliations, settlement of

third party transactions, record keeping, reporting, back office support for transactions, implementation of central bank policies, risk management and tax compliance. According to this classification, almost every part of a bank's operations – clearing and settlement of payments, transfers, remittances for clients and for third parties, inspection of records to make sure that banking procedures are being applied according to guidelines, dealing with uncertainty, servicing, etc., have been classified as back-office work (Sheth et al., 2022; Yang et al., 2024).

Fig 8.1: Transforming Back-Office Banking Operations

8.1.1. Background and Significance

In response to the mounting pressures from numerous mega trends currently changing the very fabric of financial services, incumbent banks are embarking on a hugely ambitious transformation agenda aimed at not only maintaining, but enhancing their customer proposition and competitive position. Simultaneously driving the transformation agenda from the back office, intent on fundamentally transforming the cost base of the business and the customer experience, are the industry mega trends of

heightened regulatory scrutiny, increasing operating costs, disintermediation by fintech entrants and the current monetary policy.

In addressing these very real challenges, incumbent banks are increasingly looking towards outsourcing as a key lever for transformational change. Traditionally however be it a back room processing or a financial services utility, outsourced operations decisions have focused quite narrowly on the transactional costs associated with offshoring as opposed to the total lifetime costs - experts estimate that operational performance deficiencies can account for as much as 60% of the lifetime costs of outsourced back office operations. Implicit in this focus are the assumptions that management and control costs associated with back office outsourcing will be significantly lower than for comparable levels of in-house operations and that the performance achieved through outsourcing will more than offset the downside risks associated with vendor selection, incentive misalignment and organizational inertia - the real opportunity for banks then is in breaking free of this traditional outsourcing paradigm by leveraging intelligent process automation to mitigate the significant risks.

8.2. Understanding Back-Office Banking Operations

The operations carried out by a financial institution in the execution of transactions and adherence to various statutory requirements through a multitude of processes that provide essential support across various departments are called "back-office" operations. These are usually mundane tasks that help in the day-to-day functioning of organizations, without necessarily involving interaction with external clients or customers. Back office usually consists of the "operations, accounting, technology, settlements, record keeping, security, control, risk management, servicing and other key support functions."

The back-office provides essential support to an organization to carry out its functions efficiently without being customer-facing and responsible for core revenue generation like the front-office. Operationally associated with the back-office teams are the makers, the checkers, and the approvers. It is essential for the back-office unit to carry out the settlement transaction in a very short time frame as it actually has an asset and a liability on its book until the settlement is done. It is essential to operate with sufficient controls for safeguards and corrections if any error occurs. Banks nowadays offer tax protection and many other services through the back-office units. The processes themselves vary and can be very diverse such as the core banking services for inter-branch clearings, settlement of treasury and other third-party transactions, secure record-keeping, system administration and maintenance of software packages and core banking software, security services, etc.

8.2.1. Definition and Scope

Back-office banking operations are the activities that secure the fundamental framework within which banking functions are performed, but that do not directly participate in those transactions. For example, the functions of identifying potential customers, or establishing conditions governing their relations with the banks, are front-office activities. By contrast, the bookkeeping functions that record and register these transactions subsequently, as well as those that assure that the payment and receipt of funds associated with those operations have moved through the banking system, are back-office activities. Likewise, securing the funds necessary to guarantee payment for transactions and developing and maintaining customer relations are front-office operations. However, ensuring that the collection of funds for cover of those transactions has been completed, coordinating those collections with corporate clients, ensuring that the right amounts have been credited at the right time, are all back-office functions.

As this example indicates, back-office banking operations include transaction verification, settlement, accounting, and reporting on transactions initiated by the front office. The back office, in addition, is responsible for funds management and provision, management of the systems that support the connections and that process the operations, and resolution of any problems involved in those transactions. These activities may be directly or indirectly related to each front-office function: payments, collections, security issues, or advisory services, for instance. Hence, while the back-office functions support and facilitate the front-office activities.

8.2.2. Importance in Financial Institutions

Considering the importance that the back-office banking operations has for any financial institution, whether at a global level or in Colombia, this chapter has set out to deepen the study of automation and seek to answer these questions. In the traditional banking model, banks, regardless of their size, offered services such as saving, leasing and commercial loan services; transferring funds; trade in debt securities and financial derivatives, and collecting deferred loans, with a profit margin based on the interest spread. In turn, the administration of financial entities was in charge of attracting resources through savings accounts, certificates of deposit and transfer or checking accounts, and using these resources to issue commercial loans. In turn, financial institutions incurred costs for midday services such as credit card processing, branch operating expenses, fraud losses on electronic and physical transactions, and interbank network access costs. To carry out these tasks, the financial groups adopted large back and middle offices that allowed them to optimize the efficiency of financial operations. The information about these back operations was generally threaded, collected and

processed in an isolated manner by the systems that handled the respective retail banking, credit or treasury operation processes.

8.3. Challenges in Traditional Back-Office Operations

Back-office operations are not as glamorous as their front-office counterparts like portfolio management or trading, but they matter a great deal. The back office consists of those divisions that support the front-line functions in banks and financial services companies by handling administrative and other functions. This support is of critical importance for efficient running of day-to-day businesses. Without proper trade settlement and clearing, trade fails can wreak havoc on the financial system. If cash and collateral management services are not properly provided, funds can be misallocated and risk levels can be incorrect. In the payment space, if transaction processing and consumer activation functions are not error-free and fast, consumers face delays that can cause them financial woes, damage relationships with the banks, and even have a reputational impact on market players. In the world of online banking services, if transaction monitoring functions are not well executed, banks can face data integrity issues and legal sanctions due to service failures. A failure in any of these key functions can lead to increased operational risks, inadequate liquidity management, exposure to erroneous data, degrading customer service, and damage to the banks' reputational capital.

Furthermore, with regulators expecting substantial reforms in risk supervision, the challenging and competitive environment which banks are operating in, weak balance sheets due to crises in developed economies, and a surge of rapid technological change, banks are looking at cutting costs and increasing productivity in their back offices. However, traditional back-office functions in banks are still mired in antiquated processes using legacy systems and manual intensive work cultures. It is time for banks and financial services firms to reconsider the way they conduct back-office operations.

8.3.1. Inefficiencies and Bottlenecks

In a typical scenario, in the back office of a bank a new consumer account report will be captured on a mobile or Web application, but the capturing of the document is not the end of the processing of the new consumer account report. The consumer account report initiates many subsequent processes and decisions; each of them involving multiple people and functions of the bank. The back office of the bank operates like a complex assembly line. Only about 40% of the participants in these hard-working back office processes are engaged. People constantly juggle the account report between their email, desk, and In-Basket. Consumer account reports languish for weeks, becoming stale and useless. Account report progress updates rarely reach the consumer in a timely manner.

This often results in customer dissatisfaction. These inefficiencies create additional costs, operational risks, and compliance risks for organizations.

Friction is generated in traditional back office processes due to the narrowing of expertise of people in the functional silos. As a result, by design, they must collaborate and exchange documents to complete their work. For every handoff, a document must be printed, delivered, and placed into the back In-Basket of another person to pick up, work on, and then return back to the originating person so it can be placed into the front In-Basket. During this period, virtually no progress is made. There are expensive delays and the documents commonly become stale. The recipients experience more email clutter. Signatures often delay account opening, especially when these are made outside normal business hours. Missing or inappropriate signatures can cause expensive mistakes. Indeed, just eight days of delay in opening a consumer account can wipe out 70–80% of the benefits from low costs and high service quality that drives retail banking profits.

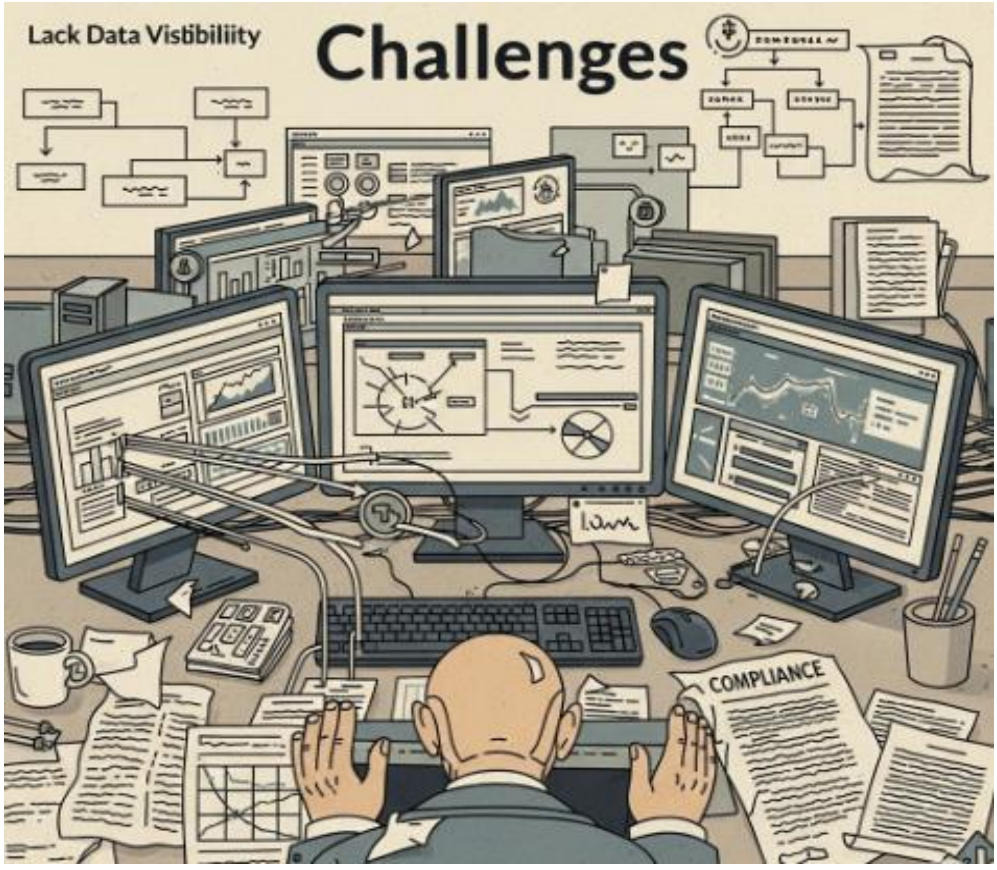

Fig 8.2: Challenges in Traditional Back-Office Operations

8.3.2. Regulatory Compliance Issues

In a period defined by the persistent fallout from the banking collapse and subsequent credit crisis, compliance with regulation and legislation looms large in financial services. Back-office operations are integral to ensuring compliance with regulation and legislation, and increasingly play a part in protecting the institution from reputational damage. Compliance costs are eating into the bottom line. Regulatory scrutiny, observance, and the concomitant requirements placed on the firm are intensifying, just as aggressive cost-cutting imperatives are demanding cost reduction strategies. Compliance costs are rising at a time when back-office operational costs are also coming under pressure. Regulatory reporting requirements are evolving into an important component of operations and technology implementations. Acknowledging this new reality, financial service firms are investing in technology to reduce the mounting compliance burden while helping themselves to create a competitive edge.

Faced with the growing demands of compliance, and working within the context of the serious technology investments already made, financial services firms are exploring new channels to ease the compliance burden. In the absence of flexible and timely reporting capabilities, institutions face the prospect of incurring excessive operational risk; of facing what could prove to be career-defining penalties; and of enhancing investor community skepticism. Important groups of stakeholders are united in their calls for clear and reliable information that provides transparency with regard to risk exposure and business activity.

8.4. Overview of Intelligent Process Automation (IPA)

Intelligent process automation combines Robotic Process Automation, Artificial Intelligence, Machine Learning, Natural Language Processing, Optical Character Recognition, Analytics, and other technologies to transform back-office operations radically. Back-office operations exist to support core business functions that provide legitimate operational purposes, customer service, growth, and profitability. Such operations center on transaction processing related to accounting, finance, and record-keeping, transaction settlement and clearing, order processing, confirmation and reconciliation, internal management, and financial reporting. Intelligent process automation focuses on these back-office support functions to improve transactional speed, enhance accuracy, and reduce costs. It allows financial organizations to optimize their business strategies, service delivery, and competitive positioning to maximize customer, shareholder, and employee value.

Financial organizations across the banking sector, including commercial, retail, investment, corporate, and cards, face sharp competition from fintech companies.

Fintechs offer innovative, convenient products and services to customers, using technology as their fundamental differentiator. Achieving this competitive edge has motivated traditional banking organizations to consider their back-office operations. Such back offices handle massive transaction volumes with a relatively low number of employees and a high degree of accuracy. These operations require coordinated, synchronized, and consistent task accomplishment through rule-based processing and support defined workflows. As such, intelligent process automation unlocks the future potential and mission of traditional banking by transforming back-office operation functionalities. The intelligent process automation strategy will create digital workforces that enable banks to migrate to a new horizon.

8.4.1. Definition of IPA

The rapidly growing focus of organizations on accelerating digital transformation of their business is driving the increased attention to Intelligent Process Automation (IPA). There are multiple evolving definitions of IPA and it is still early days for the development of a comprehensive and coherent definition. This is an attempt at a succinct definition, followed by a longer exposition with a more detailed discussion of the key concepts.

IPA is the combination of advanced technologies such as AI, RPA, Intelligent Document Processing, and low-code application development platforms, with data science/reusable AI models and services, deployed together to enable digital or intelligent workers who can execute multi-step tasks on behalf of humans. This ability enables organizations to significantly accelerate their digital transformation journey over a wide range of back-office banking operational functions.

IPA is the use of Artificial Intelligence, Machine Learning, Natural Language Processing, Intelligent Document Processing, chat and voice bots, Low-Code or No-Code application development platforms, Robotic Process Automation, and Cloud services in concert with each other, to define and execute alone, without additional human intervention, business processes in a fast and flexible manner that span across and change the structure of existing front-office and back-office IT systems. This ability enables organizations to deploy intelligent digital or automation workers that assist or work on behalf of humans in performing multi-step customer and business insensitive, or transactional, tasks. Such tasks do not inherently require human interpersonal or complex non-standard decision-making and judgment capabilities to complete successfully.

8.4.2. Key Technologies Involved

Intelligent Process Automation (IPA) brings together many familiar and emerging technologies, harnessing their capabilities to fundamentally change how organizations run. While some of these capabilities have been available off-the-shelf for many years, it is only now, with the maturing of both the technologies and our approaches to building intelligent software, that applying these capabilities together with greater ease, speed and collaboration. IPA technologies include:

- Business Process Modelling (BPM): Currently, many organizations use Business Process Management (BPM) tools to automate workflows and optimize workflows. These tools typically employ low-code interfaces, easily allowing Citizen Developers to expose business processes to automation. Smart BPM tools incorporate analytics to continuously monitor, detect and diagnose process deviations. Some even provide recommendations about the appropriate direction for process optimization.

- Robotic Process Automation (RPA): RPA is at the very core of what IPA provides: the automated execution of business processes by a software robot, a "bot." The traditional strengths of RPA have been its speed and simplicity: Organizations can create, implement and manage bots within days and weeks. Bots also are quickly and easily deployable by Citizen Developers, staff with little or no coding experience, who understand the business processes being automated. New and evolving capabilities embedded within RPA enable organizations to automate even the most complex processes. These capabilities include intelligent Document Processing to analyze and extract data from images, PDF files, scanned documents, handwritten documents, and high-variation Word documents; supported cognitive capabilities to recognize objects and people in images and videos and interpret the human speech in videos; and the use of machine learning algorithms that further "train" bots to better understand what to do next, in line with what humans would interpret as the next steps.

8.5. End-to-End Automation Framework

Where would one start creating an end-to-end automation framework? There are two distinct stages in developing an end-to-end process automation system. The first stage is process mapping and reengineering, which leads to a visualization of how processes flow through the different departments creating inputs and outputs for different activities while it also identifies the current pain points. The second stage is the integration of the different process automation technologies together into a single solution. The former ensures that the organization is automating the right processes in the right way while the latter ensures that the organization is utilizing technology to the fullest at every step of

the way in every department. This chapter takes the reader through both stages in the framework creation process.

Process Mapping and Reengineering

Mapping out processes can be a daunting task, especially in large financial services institutions. For an organization to reap the benefits of a centralized workflow with end-to-end automation, it needs to map out the entire organization's processes first. This principle sounds simple, but it is often very difficult to stick to as organizations involved in an automation push tend to focus too much on individual departmental successes that they lose sight of the bigger picture. It is of utmost importance for management to remember that an individual department-level automation may even cash fast savings by upgrading outmoded document handling or retrieves their competitive advantage in terms of speed by automating previously boring and tedious processes. These savings and advantages can only be realized at the enterprise level within an organization through a centralized and comprehensive automation. This is not just common sense but the result of research conducted in the manufacturing industry, who pioneered the process improvement movement with their quest for total quality. The experience of the manufacturing industry has shown that optimizing any one operation without understanding how it fits into the business as a complete system will only deliver localized improvements.

8.5.1. Process Mapping and Reengineering

In this section we will explore the significance of end-to-end processing and some tools to achieve that. We will specifically explore the process mapping and reengineering, as prerequisites for automation. Process mapping is a detailed description of any task undertaken by the business along with refinements required for data and exceptional handling. It is accompanied by current state and future state Business Process Management diagrams to identify the steps for which automation can be used for. Process reengineering may remove redundant steps and designate exceptional handling to Automated Command Center or human operators.

Business Process Management provides a graphical modeling tool that maps tasks across business functions, highlighting process flows throughout the organization. BPM uses Business Process Model Notation standards to represent workflows showing the graphical flow of activities across wholes. Activities on the Primary path are normally organizational tasks that are repeated with high frequency. These are ideal candidates for end-to-end automation using RPA along with cognitive capabilities of AI and ML. While, activities off the primary path are normally exception handling of edge cases. These are suitable for hybrid automation using RPA.

Mapping of BPM is also used to derive process measurements, key performance indicators and skills competency matrix required to manage the business processes. It is useful to obtain the automation opportunity and priority for the task. Few of the commonly used criteria are pain, time, frequency, volume, complexity, policy. It also records the cycle time to execute the primary flows and the percentages taken to extract, transform, and validate data from different sources.

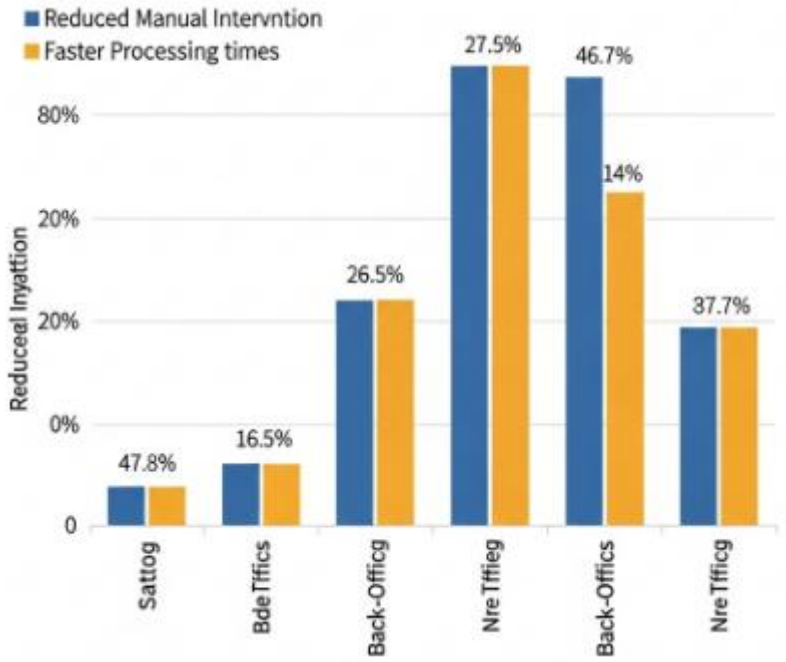

Fig : Back-Office Banking Operations through End-to-End Intelligent Process Automation

8.5.2. Integration of Technologies

Automation should not be a discussion on Robotic Process Automation or Artificial Intelligence or any other technology, but the marriage of many technologies that make a task or outcome of that task automated faster and efficiently with much lesser costs and with least breakage. Robotic Process Automation technology is an action scripting that mimics all or part of the manual effort and time needed to perform the rule-based pieces of logic in a process. RPA comes in handy when the application that is being automated has no APIs or does not allow APIs or would still require some human intervention. RPA is the quickest and cheapest way to automate some or all portions of a process and is not considered intelligent as RPA has limited cognitive capabilities and is unsuitable when the process has too many exceptions or needs manual intervention after every few runs.

Intelligent Document Processing subset of Intelligent Automation automates the document collection, verification, and reconciliation steps in a straight-through process that's key to powering enterprise financial systems. The technology is capable of given the complexity of scanned client submissions loaded with verification errors. It addresses the document and verification step issues and provides automation to stringing validated digital submission data to client records to deliver real-time submissions from any integration partner. By stringing the verified self-service submissions to the existing records across the enterprise per product or shared services, then the documents and hardening operations can be removed from the process. Staying disconnected from the source and across systems and services speeds up the time from looking for the paperwork to making it simple for the client. The overall goal of the end-to-end automation framework is to reduce the human effort needed for handling exceptions and increasing the straight-through-processing rates in financial systems, which enables lower costs for operators while providing the best possible service at the right time to clients.

8.6. Conclusion

Transformation of banking should not focus on the customer-facing functions. The back-office functions are equally important as they impact every transaction at the bank and thus affect the customers. Banks that continue to persist with the large overheads associated with the manual, error-prone processes that offer limited flexibility will risk losing their competitiveness in an increasingly digital world. Back-office processes, where high volumes of transactions occur need to be industrialized with the application of a range of technologies, including Intelligent Process Automation. By becoming nimble-footed, banks not only make themselves more agile and cost efficient but also more competitive in the long run.

The exponential growth of various elements of the business has helped to incrementally reduce the cost-yield gap for banks, enabling them to leverage technological advances to manage the operational elements of the business, protect margins, and thereby achieve continued profitability. However, this is fast becoming a threat with the dramatic increase in the range and number of products and services, changing customer behaviors and lifestyles, a bursting technology landscape, emergence of new players, and entry of the non-banking players. Banks are also increasing their spend on customer-facing technology as consumers and businesses alike are expecting frictionless access to and service experiences from their banks. However, investment in new channel technologies, while required, can affect short- to medium-term profitability as these also need continual maintenance and upgrades as new channel options become available. With the plethora of banking functions and complex processes behind each function, while there

are numerous fragmented solution offerings from system integrators and new-age niche players, there is no single integrated solution to streamline the entire range of operational processes, driving further efficiencies and integration across banking functions.

8.6.1. Emerging Trends

This section highlights some of the emerging trends in intelligent back-office process automation in banking operations. Transforming operations and service delivery by implementing next-gen intelligent process automation is led by three key trends: businesses across industries are investing in AI to augment human activity and underscore better coordination of people, processes, and AI, the intelligent automation ecosystem enabled by advanced ICR, ML, and process mining technology, and the foundation LOB driven process consolidation.

Business value is derived from reinforcing organizations' alignment with the demands of the digital customer and providing them choice, convenience, and a consistent experience. The digital customer paradigm requires that non-core business processes inherent to back-officing be digitized. Towards this objective, businesses are fast adopting a new generation of intelligent process automation solutions. The intelligent process automation ecosystem, spearheaded by innovative companies from various sectors, is becoming a reality. Powered by advanced incremental innovation of basic document processing capabilities, ICR, ML, and advanced analytics, this ecosystem is morphing to encompass other mission-critical capabilities such as business process and IT service management, analytics-driven process mining, workflow management, customer service management, and infrastructure management.

End-to-end intelligent process automation is supported by the recently evolved macro technology shift in enterprise application development, typically characterized by the low-code approach. Addressing these challenges and scenarios and enabling organizations to tap the core strength of business technology by redefining the business value of the process ecosystem is the promise of next-gen end-to-end intelligent process automation modeling. Design and management LOB driven models present an attractive value proposition for organizations and vendors alike. For organizations, it offers the strategic advantage of business process consolidation and comprehensively addressing service performance management objectives. For enterprise software vendors and IT service management vendors, the LOB driven model offers the opportunity of reinvigorating business technology development and deployment spend by clarifying ownership, enhancing accountability, and providing incentives for the IT function.

References

Sheth, J. N., Jain, V., Roy, G., & Chakraborty, A. (2022). AI-driven banking services: The next frontier for a personalised experience in the emerging market. International Journal of Bank Marketing, 40(6), 1248–1271. https://doi.org/10.1108/IJBM-09-2021-0449

Bhattacharyya, A., Yu, Y., Yang, H., Singh, R., Joshi, T., Chen, J., & Yalavarthy, K. (2025). Model risk management for generative AI in financial institutions. arXiv. https://arxiv.org/abs/2503.15668

Kovacevic, A., Radenkovic, S. D., & Nikolic, D. (2024). Artificial intelligence and cybersecurity in banking sector: Opportunities and risks. arXiv. https://arxiv.org/abs/2412.04495

Hasan Chy, M. K. (2024). Proactive fraud defense: Machine learning's evolving role in protecting against online fraud. arXiv. https://arxiv.org/abs/2410.20281

Yang, H., Zhang, B., Wang, N., Guo, C., Zhang, X., Lin, L., Wang, J., Zhou, T., Guan, M., Zhang, R., & Wang, C. D. (2024). FinRobot: An open-source AI agent platform for financial applications using large language models. arXiv. https://arxiv.org/abs/2405.14767