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AMPLIFY

Anticipate, Innovate, Transform

Disruption in Banking and Financial Services

CONTENT

DISRUPTION IN BANKING AND FINANCIAL SERVICES

BY PHILIPPE DE BACKER, GUEST EDITOR

The world of financial services is in a period of striking change. Faced with the upheaval of COVID-19 and several major recessions, many businesses are experiencing constraints and failing. Banks face increasing regulation and compliance even as new technologies transform financial services and client industries. This is changing consumer behavior on an unprecedented level, all while product commoditization adds volatility and increases risk. Of course, when threats emerge from disruptive forces, so do opportunities to transform for the long term.

What banks must understand is that technology is no longer a differentiator. It is now an enabler and thus not something you need to own. This realization opens up the entire world as the role of fintechs changes from a threat to a stepping stone that can lead to a new point of arrival.

To survive and thrive, traditional banks must adopt a more exploration-oriented mindset. Leaders must act quickly to implement radical changes on all fronts, balancing short-term value drivers with innovation to spur growth and transformation. Those that can harness change to their advantage will shape the future of finance.

Take the accelerating convergence trend, which is the tendency for once-disparate sectors (like banking and telcos or retail) to come together. This represents a fundamental growth opportunity because it simultaneously enables the creation of new products, features, or services and the destruction of those less valued. To exploit such opportunities and help defend against threats, banks will need to build on their skills and assets to create a differentiated mix of products and services, quickly plugging gaps where these are lacking. For example, we have seen incumbent banks innovate by offering banking as a service that nonbanks can use to serve their customers as more companies and ecosystems embrace embedded finance offerings.

When exploring innovation, banks should first choose which business models and profit pools to focus on, based on their strengths. As they align their organizational resources, data capabilities, and technology as part of their broader strategic shift, incumbent banks will become more specialized, moving away from universal banking models that are unsustainable and have fallen out of favor with the markets. Citibank, for instance, recently exited the consumer, small business, and middle-market banking operations of countries outside the US (Mexico, Europe, Asia), keeping only an institutional presence focused on its private banking clients, a segment where the bank has a competitive advantage.

To become more attractive to investors, traditional banks must carefully pick their battles, aiming for a higher risk-adjusted, short-term profitability/long-term growth outlook with new revenue streams, which will increase their valuations. They are still trading at a growing discount to other sectors, valued below new entrants because investors recognize radical specialization as greater than the traditional universal model. Some better-performing banks have managed to slow the erosion of their margins, but they still aren't delivering the return on equity that capital markets expect, which is why investors remain unconvinced of the long-term viability of the legacy banking model. Banks that continue to struggle are likely to be increasingly penalized by the capital markets.

As it is, banks in Europe are trading below net tangible book value, making it ever more difficult for them to raise the capital they need to fund their much-needed transformation. When the market considers that tomorrow's value of a bank is less than it is today, that bank can't raise capital without destroying its own market value.

In the coming years, it will be critical for banks to provide capital markets with convincing results of engaged, pivotal transformations — investors will be watching closely.

IN THIS ISSUE

This issue of *Amplify* explores a number of aspects banks should consider when embarking on a broad strategic shift, including adopting a modular architecture approach, considering technology agoras where banks can increasingly collaborate with fintechs, implementing explainable artificial intelligence (XAI), looking at the wider picture and answering a full set of foundational questions, or applying a proven systems engineering approach.

In our first article, Daniel Gozman and Jonas Hedman describe a modular architecture approach to taking banking to the next level. Modular architecture lets banks build their value propositions into services, functionalities, and raw data while enabling new distribution and service creation. Using a four-pronged framework, the authors explain how banks can continue their current role as integrator (providing all services under one brand) while expanding into roles such as producer (banks create a service and a third party distributes it), distributor (banks distribute third-party services), and platform (banks facilitate other businesses by acting as an intermediary). Gozman and Hedman end by exploring the framework's potential challenges and opportunities and summing up the ways modular architecture could revolutionize banking.

IN THE COMING YEARS, IT WILL BE CRITICAL FOR BANKS TO PROVIDE CAPITAL MARKETS WITH CONVINCING RESULTS OF ENGAGED, PIVOTAL TRANSFORMATIONS

NONBANKS AND FINTECHS ARE ALREADY WAY AHEAD OF THE CURVE BECAUSE THEY'RE THE ONES THAT SET OUT TO DISRUPT IT IN THE FIRST PLACE

Next, Antonios Kaniadakis sets out to illustrate that banking disruption is not being driven by technologies like AI and decentralized platforms. Rather, he believes it stems from technology commoditization and industry players repositioning themselves within the sector — becoming disruptors, innovators, fashion-setters, or all three. Kaniadakis suggests banks imagine a technology agora, explaining that an agora was a physical space where citizens in ancient Greece sold and bought commodities, acquired knowledge by listening to philosophers, and debated with city officials. If we envision a technology agora where technological artifacts are developed and commoditized and interested parties exercise influence over innovation choices, Kaniadakis believes we will see that fintechs and banks are not so much competing with each other as they are collaborating.

Our third article, written by returning *Amplify* author Cigdem Z. Gurgur, dives deep into the role of AI in banking disruption. With AI systems now equaling or exceeding human performance, it's increasingly important to understand the reasons a prediction is made. This is especially true in banking, where financial stability is at risk if the underlying mechanisms driving market-moving decisions are not well understood and where consumers must be protected from technology-related bias. Gurgur explains the limitations and possibilities inherent in XAI and gives examples of AI's potential to increase accuracy and fairness over the current statistical models guiding credit and lending decisions.

Next, we hear from Arthur D. Little's Ignacio Garcia Alves, Philippe De Backer, and Juan Gonzalez, who tell bankers in no uncertain terms that they cannot stall the shift to digital transformation. Legacy systems have been a major factor in this delay, but the authors say banks have a chance to come out ahead of fintechs — provided they have the right answers to 11 key questions. Through these questions, the authors make it clear that banks must think much bigger than they are currently, make sure they fight the right battles, and move faster despite not knowing exactly what's coming. They also advocate for putting an ambidextrous leader in charge, one that can deliver significant growth and productivity improvements in the short term while completely redesigning the bank's business model. They discuss the role of the board and the customer, organizational culture, technology investment, the need to set aside corporate ego, and the billion-dollar question: are you ready, willing, and able to move to where you need to be?

Finally, Maik Dehnert warns that banking's current heuristic approach to digitization will not be successful. He offers a systems engineering approach as an alternative, in which analysis, followed by synthesis, realization, execution, and evaluation, are used to transform banking organizations. After describing each step in detail, Dehnert explores the role of robust risk management in planning for future technology needs. The article concludes with the observation that nonsystematic transformations like the ones being pursued by many banks today are not sustainable and that a systems engineering approach can both advance digitization and allow for experimentation.

CONCLUSION

It's clear that in this topsy-turvy new environment, nonbanks and fintechs are already way ahead of the curve because they're the ones that set out to disrupt it in the first place. Their start-up mentality means they're more focused, aligned, nimble, and aggressive; in other words, well placed to exploit the weaknesses of legacy providers.

Some traditional institutions will be better equipped than others to cope. Because of their deep pockets and the fact that they're relationship-driven, corporate and investment banks are least likely to have to readjust. For the universal or retail bank, though, it's a very different picture — in this game, trying to be all things to all people will nearly always end in disaster.

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REVOLUTIONIZING BANKING THROUGH MODULAR ARCHITECTURE

Authors

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Daniel Gozman and Jonas Hedman

Banking is changing. One reason centers on the increased importance of the financial sector in society, labeled as financialization.[1] A second reason relates to governmental pressure on banks to increase competitiveness and regulatory reforms pushing open banking, where customers can securely share their account information with third-party providers.[2] A third reason involves the new digital capabilities that enable the restructuring of the IT landscape.[3] The response from the banking sector is the use of modular architecture, including application programming interfaces (APIs), to increase openness and enable new business models.

Modular architecture lets banks break their IT infrastructure into smaller, independent software components. APIs function as interfaces between the components, controlling and governing the exchange and interaction between them. According to the Open Banking Implementation Entity (OBIE), APIs enable "customers and SMEs to share their current account information securely with third-party providers, who use that data to tailor their apps and services to peoples' specific financial circumstances."[4] This creates opportunities and challenges in the creation and distribution of banking services and lets banks structure their business according to modular principles.[5]

Bank movement toward modular architecture is comparable to the first-mover experiences of other industries in the past decade — offering significant opportunities within a developing yet contested environment.[6] As providers of underlying infrastructure, banks face significant pressures related to maintaining and running large-scale operations that require constant uptime but contain a huge amount of legacy software.

Additionally, banks operate in a strict and changing regulatory environment. Although upcoming regulatory roadmaps from the EU have been communicated to banks, translating these into compliance plans is a time- and cost-intensive process.[7]

BANK MOVEMENT TOWARD MODULAR ARCHITECTURE IS COMPARABLE TO THE FIRST-MOVER EXPERIENCES OF OTHER INDUSTRIES IN THE PAST DECADE

Modular architecture lets banks build their value propositions into services, functionalities, and raw data while enabling new distribution and service creation. In this article, we describe a two-dimensional framework that shows how modular architecture enables four distinct roles (integrator, producer, distributor, and platform) to emerge and revolutionize traditional banking.

4 BANKING ROLES

Modular architectures lets new actors distribute and create banking services. These include: (1) fintechs, Internet giants, white-label banks, and mobile operators that distribute existing banking services to new customer segments; and (2) third-party actors that create reusable, scalable banking services for distribution by established banks.

These two dimensions lead us to identify four roles in banking: integrator, producer, distributor, and platform (see Figure 1). Most large banks are rooted in the integrator role (full-stack bank), controlling every aspect of the business in-house. Through various collaborations and partnerships with third parties, banks also play the roles of producer (white-label clients) and distributor (infrastructure/core banking service) across various business lines. The platform role is still at a very early development stage, but in Europe, we find pure third-party firms such as API providers Aiia and Tink. The following sections describe the four banking roles in more detail.

ROLE 1: INTEGRATOR

The full-stack bank creates and distributes all services to the customer in the integrator role. The bank provides all services under one brand and fully controls the customer experience. It also controls the underlying infrastructure. Currently, most banks play the role of integrator, as they control the whole value chain and have done so in the digital space since the early days of the Internet.

Creation of banking services

Figure 1. New roles in banking (colored boxes indicate areas of control)

For instance, many banks use online and mobile channels to provide account information, payment services, and investment information to customers. This role is the prevailing norm for banks today.

ROLE 2: PRODUCER

In the producer role, a minimum of two parties create services for the customer. The bank creates the service, and a third party (e.g., a neobank) distributes the service to the customer. Customer ownership and branding can be challenging for producers. For example, the EU's Payment Service Directive 2 (PSD2) forces banks to open up their banking infrastructure to third parties, emphasizing their producer role, particularly regarding account information and payment initiation services.[8]

Most large banks are working on a fintech collaboration strategy, but some are less inclined to adopt a producer role. Extra revenues and innovation may seem attractive, but they come with increased regulatory and compliance risks. In the B2B space, producer roles are already institutionalized for distribution purposes through private APIs for functions like data sharing and payment initiation.

ROLE 3: DISTRIBUTOR

Modular architecture can be instrumental in leveraging a bank's Internet and mobile distribution channels, which have created a large digital customer reach over the past decades. As banks open up, they may extend their digital market presence by distributing third-party services. This is not an entirely new concept; banks have long distributed funds to other institutions and credit card companies. The challenges related to customer ownership and branding are similar to the ones noted in the producer section.

Today, many fintechs act as distributors within the payments industry. For example, e-commerce payment service providers repackage and distribute payment services created by banks and by payment service providers like PayPal, Apple Pay, and Sofort. However, banks could extend their role as distributors to become third-party providers, perhaps through account aggregation and payment-initiation services held at one or more depository organizations.
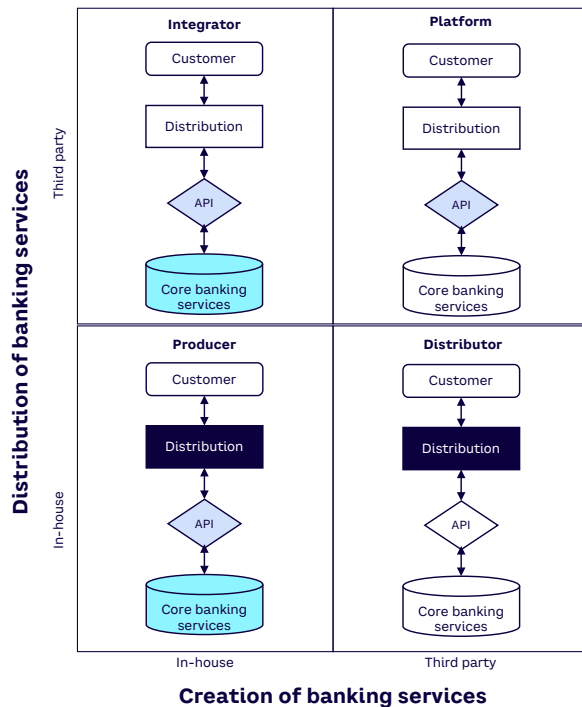
ROLE 4: PLATFORM

A platform facilitates other businesses by acting as an intermediary. As a platform, banks could offer party matching, traffic, and security features like "know your customer" (KYC) and anti-money laundering (AML). Note that in the banking world, unlike IT, "platform" refers to the IT infrastructure needed to run a bank. Banks as platforms aren't quite the norm, although Germany's Fidor Bank is an example. Several fintechs have adopted this model as a starting point in lending and crowd-funding business. In the platform role, the bank is a facilitator for third parties and their customers. Note that banks may allocate roles to various lines of business, including the platform role.

CHALLENGES & OPPORTUNITIES

Our framework illustrates the multifaceted nature of modular architecture and shows how it creates challenges and opportunities for the banking industry. The framework shows how it will affect the distribution and creation of banking services and the structure of the industry in the long run.

CHALLENGES

The first challenge for banks is the potential for disintermediation: modular architecture could lower a bank's ability to retain its customers by giving third parties direct access to them.[9] Open banking might become the new normal for certain groups of customers in the future; this could accelerate the decline of traditional banks as the de facto financial services provider.

The second challenge is reputation loss. Currently, bank reputation is mainly related to security challenges (e.g., potentially fraudulent third parties, digital intrusion, personification, illicit use of data, and customer privacy concerns). Security of funds and personal data is a prerequisite for using transactional and custodial services in the financial industry. A bank's reputation depends on its customers' perception of its trustworthiness. As open banking increases customer awareness of data ownership and security, banks should consider creating a governance model that ensures participating third parties cannot damage their reputation.

The third challenge relates to transformational issues. Banks must have the organizational and financial resources to manage a modular architecture. They must provide the technical functionality with its associated load of boundary resources to third parties while maintaining their current operational standards.

It's possible that some banks will encounter such deterioration of their customer base that they can no longer benefit from economies of scale. Banks with business models that rely on high amounts of scalability will experience cost pressure due to decreased volumes. Technical challenges and the challenges arising from the transformation of the banks' value proposition can also be among the organizational challenges that a bank faces on its way to becoming a digital services provider. Another challenge will be co-opetition and dispute resolution with third parties. At an industry level, the changes that come with open APIs will also change the current business models.

OPPORTUNITIES

Modular architecture allows banks to enhance their service offerings in two ways. The first is extending current products and services beyond payment or account services (i.e., toward digital identity services). The second is moving into a new space by sharing and aggregating client data from various accounts and enriching existing data with that of partner banks and fintech market participants. This can lead to enhancements in innovation through improved data analytics.

The second opportunity relates to broadening and improving service distribution. The uncertainties surrounding service provisioning currently prevent banks from distributing their product offerings through the digital platforms of other banks or third parties. An open banking environment provides a standardized, shared-service provision model that can distribute multiple products and services across platforms and devices with other banks and fintechs.

A modular architecture makes it easy to bundle and unbundle services. This lets clients choose from a range of product offerings (possibly across different banks and fintechs), increasing customer relevance through customization.

The third opportunity is enhanced risk mitigation. A standardized approach to distributing services enables a standardized approach to security. In this way, banks can enhance their branding as a safe, trusted party while benefiting from improved reach. Improved information sharing between banks is also expected to improve decision-making and mitigation measures regarding fraud prevention, KYC, and AML.

CONCLUSION

Modular architecture has the potential to revolutionize banking.[10,11] It will create new roles and business models in the banking sector, defined here as integrator, producer, distributor, and platform. The five most important observations are:

1. **Modular architecture is paving the way for disruption of the traditional banking model in which banks provide all services and own the customer.** This is the fundamental idea behind PSD2 and the EU's emphasis on increasing competition by opening up the core banking infrastructure, which fueled the discussion around open banking across Europe as a catalyst for fintech innovations.[12]

2. **Modular architecture affects existing banking services and distribution channels.** Service and distribution strategies have always been at the core of what banks do. Digital technologies provide new possibilities and challenges in terms of scale and scope to service and distribution in the digital era.

3. **Banks must make strategic choices regarding modular architecture.** Banks struggle to find and express their own unique selling proposition to co-create value in open business environments. Therefore, they should both review their current services and distribution strategies and explore new business models that move beyond current offerings.

4. **Sector technical standards could maximize the benefits of openness in banking if they move beyond mere technical standards.** Enhanced standards are required to create interoperability and enable cost-effective, easy integration. The level of acceptance in sector standards is key to success and is determined by the scope of the user group (individual, community, industry, and universal) defining the standard, as well as the scope of standardization (technical, functional, operational, and legal). Financial services require security, privacy, and compliance. Therefore, API standardization will need to develop beyond technical and functional aspects to include legal and operational aspects and governance. Using standards could reduce banks' overall investments and risk.

5. **Modular architecture with standardized APIs as the enabling technology is still in the infancy stage, but we expect rapid and collective maturity.** This could lay the foundation for an industry-wide dialogue that includes both bank and non-bank stakeholders.

A critical period lies ahead for the banking sector. New strategies will have to be forged, driven by regulation and the opportunities arising from changing customer demands.

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UNDERSTANDING THE TECHNOLOGY AGORA IN BANKING AND FINANCIAL SERVICES

Author

Antonios Kaniadakis

At the end of November, banking and financial services company HSBC announced it would close a quarter of its UK branches in 2023, after having closed 69 in 2022 and 82 in 2021.[1] This might sound like the company is in trouble, but that's not the case. In fact, HSBC recently reported profits of US $700 million more than predicted.[2]

What does this tell us about disruption in banking and finance? First, that established banks are doing pretty well. Second, that if there's disruption happening, the technology behind it is not an emerging one like machine learning (ML) or blockchain. Rather, it's a mature technology — the Internet. Third, that disruptions, especially those involving a new technological paradigm, take time to manifest.

The hype around online banking has been growing since the 1990s, recently moving from excitement about Web-based services to mobile ones. But it hasn't had a major effect on established banks until now. And it's not even the technology that made the long-term shift possible (by somehow altering people's behavior). Rather, it's a generational change: digital natives are more inclined to use digital services than the previous generation. Can it be that a technology as transformative as the Internet did not manage to achieve behavioral changes to the point where established banks had to shift to fully online services?

Of course, it's not that simple. There has been a great deal of innovation and digital transformation in banking and finance, including a shift from mainframe computing to networks to Internet-based organizational models, then a slow introduction of online banking that involved quite a few failures (we all remember the dot-com bubble). At present, we're in the midst of an explosion of rhetoric around ML and blockchain and their potential to disrupt banking and finance.

THE HYPE AROUND ONLINE BANKING HAS BEEN GROWING SINCE THE 1990S, RECENTLY MOVING FROM EXCITEMENT ABOUT WEB-BASED SERVICES TO MOBILE ONES

This article argues that disruption in this sector is not being driven by technological achievements like artificial intelligence, decentralized platforms, or mobile computing, which inevitably lead to new business models and sector paradigm shifts. Instead, banking and finance changes are the result of: (1) technology commoditization and (2) industry actors pursuing strategic interests and repositioning themselves within the sector as disruptors, innovators, and fashion-setters.

ALL-POWERFUL ALGORITHMS OR ALL-POWERFUL INDUSTRY ACTORS?

How do we understand disruption as it relates to technology in banking and financial services? Popular views tend to rely on references to superior features that will disrupt market arrangements and sectoral dynamics.

Blockchain is a good example. Recent advancements in decentralized platforms have generated a lot of excitement about the future of the financial system. Blockchain, envisioned as a new alternative global infrastructure for financial services, has been termed both the "Internet of money"[3] and the "Internet of finance."[4]
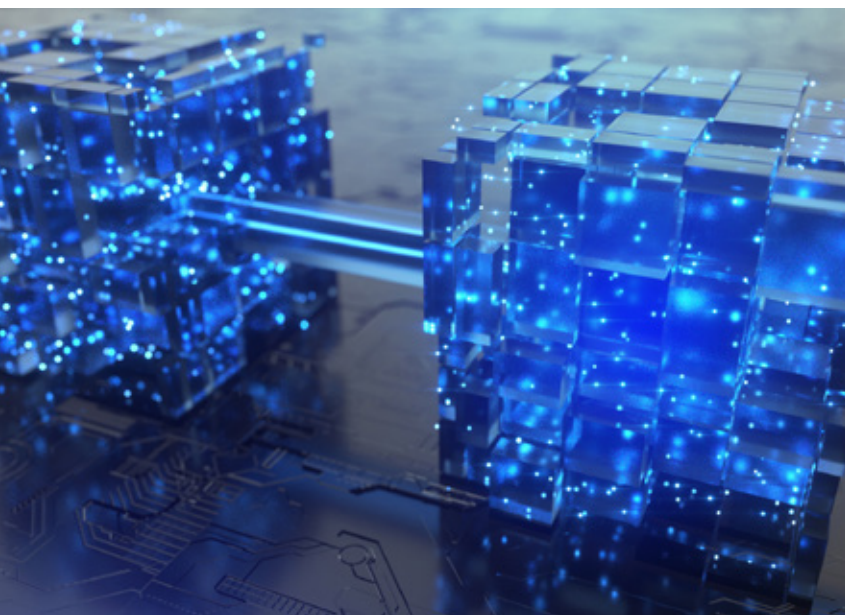
Pundits say blockchain has the potential to redefine the entire financial system and change the fundamental structures of the economy and society.[5] It's been suggested that blockchain constitutes a "trust machine" that will eliminate the need to rely on intermediary organizations with authority to regulate and verify financial market transactions, thus directing the source of legitimacy back to market participants.[6]

The power of blockchain is usually attributed to its intrinsic characteristics (architecture and code) and the transparency and immutability they afford. Blockchain code is seen as able to direct human action and verify information, eliminating the need to rely exclusively on humans. The algorithmic authority[7] attributed to blockchain is perceived as causing disruption in the sector, removing trust from the equation in a way that threatens existing business models that rely on third parties for trust.[8]

I argue that this is not an adequate (or even useful) view of technology's involvement in creating disruption. First, it's not clear why market participants would begin to trust a new, unexplored technology over established third-party institutions. Second, the form that disruption takes in various sectors at particular moments in history is not the inevitable consequence of a technological innovation that happens to be popular at that time.

Rather, the shape, scope, and nature of a disruption depends on the various actors who assemble around an emerging technology, try to make sense of it, and carve out pathways for future business innovations.

In other words, technological disruption is not an event that causes a rupture with the past and facilitates the replacement of a current recipe with a new one. It is a mechanism that industrial sectors rely on to evolve and maintain themselves.

RECENT DISRUPTIONS IN BANKING & FINANCE

We can look back to two major disruptions, one in the 1990s related to deregulation and a more recent one related to the reshaping of the financial system in the aftermath of the global financial crisis.

In the early 1990s, following large waves of financial deregulation, we witnessed what was at the time referred to as the most serious bank crisis since the Great Depression[9] and the decline of banking.[10] Banks still played an essential role in the economy, but they were no longer the only choice, as people could access banking and financial services offered by non-banks.[11]

Due to fragmented technological development and frequent M&As, banks resembled bundles of legacy systems built around product lines (loans, deposits, savings) with limited cross-functional information flow.[12] With information stored in siloed databases, banks were poorly prepared to cross-sell and were slow to respond to increasing competition from non-banks.

THIS ENTERPRISE-LEVEL DATA INTEGRATION ALLOWED BANKS TO PLUG THEIR PRIMARY BUSINESSES INTO EMERGING SECONDARY DEBT MARKETS

As a result, many banks made large investments in technology aimed at better technological and organizational integration.[13] Enterprise resource planning (ERP) systems were being successfully used in manufacturing and emerged as an innovative way to address the challenges faced by banks.[14] Banks that managed to implement ERPs and achieve integration with preexisting legacy systems were able to conduct business more efficiently.

This enterprise-level data integration allowed banks to plug their primary businesses into emerging secondary debt markets.[15] The most notable example is the mortgage securities market, a move that led to the 2008 global financial crisis that shook society's trust in the entire financial system.

In the aftermath of that crisis, technologies like blockchain emerged, challenging the status quo. Indeed, the trust-machine vision of blockchain is itself a response to the socio-technical, economic, and political developments resulting from the global financial crisis. After the crisis, trust in regulatory organizations, central banks, and credit-rating agencies was largely diminished.[16] Subsequent innovations in financial technology (fintech) seem to have put this trust deficit at the center of attention. Blockchain emerged as a response and promises a financial system in which those problematic organizations are not part of the equation.[17]

In this somewhat simplistic account of the role of technology in banking and finance disruptions, we see how processes of technological innovation unfold in the context of political and policy developments and the commercial interests of industry players, making technological disruptions difficult to unravel. To better understand them, we can imagine a technology agora.

A TECHNOLOGY AGORA

An agora was a physical space where citizens in ancient Greece or Rome assembled to sell and buy commodities, acquire new knowledge by listening to the teachings of well-respected philosophers, and engage in the political process by deliberating important issues and electing city officials.

Commercial, learning, and political activities all happened in the same space, and a philosopher's teachings might just as easily reflect the political status quo as be in opposition. This idea can help us understand how disruptions occur in banking and finance, especially in cases where emerging technologies are thought to be the cause of those disruptions.

A technology agora can be understood as a space where technological artifacts are developed and commoditized. The process includes knowledge, expertise, and discourse that help frame those artifacts, explaining their purpose and linking them to specific business contexts. It's also a political arena where participating actors pursue their interests and exercise influence over innovation choices, including the choice of one technology over another.

In banking and finance, the technology agora is populated by vendors like Microsoft and Oracle that specialize in products and services for the sector, business consultants, industry analysts and other industry gurus, governments, and interest groups aiming to coordinate activities of the other actors and influence the direction of technological innovation.

In this agora, banks buy technology products and vendors sell them. Consultants and experts talk about products and suggest how the technology could be used more efficiently while pursuing their strategic interests and positioning themselves as influential actors. Governments either promote technological innovations or ask banks to exercise some restraint around them.

After the 2008 global financial crisis, a large wave of fintech start-ups entered the banking technology agora with fresh ideas, expertise in novel technologies, and risk-seeking attitudes. For most, those start-ups were seen as a threat to established institutional and market arrangements in banking and finance.[18] Traditional banks were mostly perceived as rigid organizations not keen to adopt new technologies such as blockchain.[19] A disruption seemed to be in the making: innovative entries into the technology agora would challenge the incumbents and ultimately displace them.

There is evidence, however, that established banks and fintech start-ups were not in a competitive relationship. On the contrary, banks were busy forming strategic alliances with fintechs to benefit from new products without being involved in their development while fintechs sought access to financial resources and expertise that could help them broaden their customer base.[20] At the same time, dominant software players and multi-national technology corporations remained rather unengaged in fintech experimentation, limiting themselves to observing the start-ups.[21]

This suggests that although fintechs are an innovative force in the technology agora, their impact on banking and finance is misunderstood. They aren't trying to disrupt existing banking models — they don't have the financial resources or existing industry networks, and they lack compliance and legal expertise.

In fact, fintechs find their way into the agora by acting as idea entrepreneurs[22] and pitching use cases to established players, hoping they'll be selected by a large bank for an accelerator program, after which they'll receive funding or be assimilated. In reality, fintech start-ups are more "tech" than "fin," positioning themselves on the supply side of the technology agora, alongside existing technology suppliers.

Thus, it's not banks that should fear competition from fintechs; it's traditional technology suppliers. Collaborative relationships between established banks and fintechs are pushing technology suppliers like IBM to become more agile in an effort to maintain their position as leading technology suppliers in banking and finance.[23]

As we look into the technology agora, we see an influx of start-ups pitching visions of the future to established banks. Established banks control which of those start-ups will be allowed into the agora. Meanwhile, the larger technology vendors are in an awkward position: they have established track records with large banks but realize that relying solely on this would be a mistake (they must instead engage more fully with the fintech movement).

CONCLUSION

This article challenges two popular opinions about disruption in banking and finance: (1) that emerging technologies are independently driving disruption through algorithms and code and (2) that fintech start-ups pose a serious disruptive threat to established banks.

When a new technology makes headlines and generates discussions around its disruptive potential, it's important to look beyond its technical features. To better predict exactly what will be disrupted, how those disruptions will occur, and when those disruptions will occur, we must look at the actors who assemble around a specific technology and position themselves as influential players. In other words, we should look into the technology agora.

In the banking and financial services technical agora, we see that fintechs (as new agora entrants) and banks (as existing ones) are not so much competing with each other as they are collaborating. Fintechs' agility and technical know-how can be combined with established banks' access to resources and industry networks. Moreover, conventional suppliers like Microsoft, Oracle, and IBM feel pressure to adapt their business models and practices to fit into the emerging agora dynamic. Finally, the role of government is important because political actors can appropriate rhetoric around technological advancements to either promote or reject them.

It has taken a while for technology to have a once-in-a-generation effect on banking and finance. In the meantime, we can carefully monitor the slow reconfiguration of the banking technology agora. Understanding the role of each actor and watching the agora's changing dynamics should give us a sense of who is in position to influence future technological innovations in the sector and how.

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EXPLAINABLE & RESPONSIBLE AI IN DIGITAL BANKING TRANSFORMATION

Author
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Artificial intelligence (AI) is one of the most disruptive technologies of the past decade, transforming businesses and society in ways we could not have envisaged a few years ago. AI is also a key source of business model innovation, process transformation, and reengineering practices for organizations seeking competitive advantage in data analytics and digital culture. However, many organizations are finding it difficult to scale up their adoption, in large part due to AI's trustworthiness — or lack thereof.

The limited transparency and explainability of AI systems' outputs have emerged as a serious barrier to the much-anticipated benefits of AI — that is, confidently turning data-centric decisions into effective, actionable strategies.

Large-data set analysis, statistical and quantitative analysis, explanatory and predictive models, and data-based management only create real value when decision makers can consistently rely on them for optimizing decisions.

If analytics-driven decisions are beneficial only to the extent that they are also understandable and responsible, then analytical models must go beyond predictive accuracy and scalability to provide insights into past decisions and an explanation of recommendations.

Currently, the process of embedding transparency in AI algorithms such as machine learning (ML) to enhance interpretability, accountability, and robustness of data-driven decision-making (leveraging AI and analytics) is largely unexplored territory for both researchers and financial industry stakeholders.

Stanford Senior Fellow Erik Brynjolfsson put it this way:

> A century ago, factories electrified without rethinking their production lines and therefore saw no productivity benefits. In much the same way, ML technology without management and organizational change will be ineffective.[1]

UNDERSTANDING EXPLAINABLE & RESPONSIBLE AI

Banks and financial services companies are experiencing a period of significant technological change. AI advancements, which are happening within a wider context of digital transformation, are contributing to the disruption.

The biggest difference between AI and the digital technologies that preceded it is its ability to independently make increasingly complex decisions, including which financial products to trade. The AI field has a decades-long history and substantial links to statistical methods with long-standing applications in financial services.

THE LIMITED TRANSPARENCY & EXPLAINABILITY OF AI SYSTEMS' OUTPUTS HAVE EMERGED AS A SERIOUS BARRIER TO THE MUCH-ANTICIPATED BENEFITS OF AI

For example, the ability to predict the occurrence of certain events in advance has always been a critical factor in banking and financial services. We would be hard-pressed to identify a banking function or line of business that does not have multiple needs for predictive analytics. Similarly, the amount of data required for risk analysis in money lending (to which past information about granted loans must be added) is one of the most compelling applications of AI techniques.

Estimating the risk associated with granting a loan requires deep expertise and long experience on the part of loan and credit officers; detailed information on the specific request; and accurate information on the requester's personal data, current financial situation, and credit history.

ML models use big data to learn and improve predictability and performance automatically through experience and data, without being programmed to do so by humans. AI/ML techniques are increasingly being deployed by banks and financial services companies in areas such as credit underwriting, asset management, algorithmic trading, and blockchain-based finance, enabled by an abundance of available data and affordable computing capacity.

As reported in several studies, although AI systems are equaling or exceeding human performance, their use is still viewed suspiciously in many sectors, and the human experience is often considered irreplaceable.[2,3] There are situations in which understanding the motivations leading to a specific result is more important than the result itself. For example, understanding the reasons a prediction was made is essential to building trust in the decisions made by a given model. This is where explainable artificial intelligence (XAI) and responsible artificial intelligence (RAI) come in.

XAI is becoming a critical component of operations undertaken in the financial industry. It stems from the growing sophistication of state-of-the-art AI models and the desire for them to be deployed in a safe, understandable manner. RAI principles ensure that ML technology is applied in a transparent way while safeguarding the interest of each player in the financial ecosystem.

The need for more transparent and explainable AI methods is not limited to banking and finance. In fact, it's so widespread and important that the US Defense Advanced Research Projects Agency (DARPA) has initiated a multiyear program solely dedicated to XAI.

Not surprisingly, banking and financial services regulators have shown an interest in adopting XAI and RAI techniques to help them meet the need for model governance, operational servicing, and compliance in the digital world.

In addition to the fundamental need for explainability, the financial sector faces sophisticated adversaries with the ability to steal or tamper with large amounts of data. This calls for robust, stable methods that can handle cybersecurity-related "noise" and persist in the face of adversarial data corruption.

XAI OPPORTUNITIES

The financial sector is held to higher standards around trust and transparency than many other industries, in part because these companies are the foundation of our financial stability and economic mobility.

AI adoption in banking and financial services is underpinned by three elements: ML, nontraditional data, and automation.[4] Although innovative deployment of these three elements holds significant promise for increasing financial services' convenience and accessibility and reducing costs, it has the potential to reduce the trustworthiness and responsible use of AI systems.

ML draws on concepts from statistics and probability theory and is often used to perform the type of analytical tasks that were handled by traditional statistical methods in the past. Two of the features that make ML attractive (the ability to accommodate more data and more complex relationships in the data) can create challenges in understanding how a model's output relates to its input variables.

These difficulties in discerning how the model works are commonly referred to as "black box" or "model-opacity" problems.[5] The World Economic Forum notes that the opacity of AI systems poses a serious risk to the use of AI in the financial sector: a lack of transparency could lead to loss of control by financial institutions, damaging consumer confidence.[6]

Opacity can occur due to inscrutability, which arises when a model is so complex that determining relationships between model inputs and outputs based on a formal representation of the model is difficult to achieve. These types of models are opaque to everyone, even people with high levels of specialized technical knowledge.

For example, deep learning networks lack transparency by design, with millions or billions of parameters identifiable to their developers not with human-interpretable labels, but only in terms of their placement in a complex network (e.g., the activity value of the node I in layer J in network module K). Consequently, deep learning networks are not fully interpretable for human experts and do not allow attempts at causal inference. The inability to spot check is unlikely to result in user trust in a finance application.[7]

Opacity can also occur due to nonexpertise. Even models that are theoretically intelligible can be complex enough that they appear opaque to anyone without a certain level of expertise. In some cases, a basic level of statistics training may be sufficient to avoid this form of opacity. In other cases, understanding the model may require advanced forms of ML expertise. For example, a recent article in *Expert Systems with Applications* evaluating the model robustness for stress scenario generation in credit scoring requires technical expertise in stochastic gradient boosting.[8]

Importantly, we expect an expansion in the types of data that inform business tasks in financial services. This includes data that did not previously exist or was not accessible, as well as data that was available but went unused due to a lack of technical capabilities. For example, financial services companies should soon be able to use ML methods to analyze nontraditional structured data like financial transactions for evaluating loan applicants, profiling credit risk, and predicting mortgage delinquency.[9]

Similarly, banks and others may soon be able to use deep learning to map unstructured data like news content, recorded company-earnings calls, and satellite images of soil moisture (to predict stock and commodity prices), as well as employing textual, user-generated data from social media to predict things like credit scores and potential defaults.[10]

ML techniques can be used to discover complex relationships within data, including situations in which variables interact with each other in new ways or do not have a straight-line relationship with the predicted outcome. At the same time, ML algorithms have a random seed and are hence not entirely replicable. Every repetition with a different random seed will lead to slightly divergent results (or substantially different results if the gradient descent does not converge near optimal).[11]

A recent XAI study by Bank of England provided insights into future trends in the finance industry. The survey found that by 2025, many financial institutes will need to incorporate intelligent algorithms to fulfill customers' demands and that banks must adopt AI to raise stakeholder confidence.[12]

XAI aims to help humans understand why a machine decision has been reached and whether the outputs are trustworthy, all while maintaining high predictive performance levels. XAI is thus an important tool in increasing trust in the use of AI by the financial sector, creating a bridge between machine intelligence and human intelligence, with the goal of broadening the acceptance of AI systems by humans.[13]

XAI CHALLENGES

The prevalence of daily decision-making in banking and finance presents a unique challenge for XAI. There are two dimensions to this: macro-financial stability and consumer protection.

Financial markets transfer enormous amounts of assets on a daily basis. AI-powered automation of a substantial fraction of these transactions, especially by big players in key markets, poses a risk to financial stability if the underlying mechanisms driving market-moving decisions are not well understood. In a worst-case scenario, this could trigger a financial market meltdown.

On the consumer-protection side, automation is tightly regulated. In the US consumer credit space, the Equal Credit Opportunity Act (ECOA)[14] requires that explanations be provided to consumers for any adverse action by a creditor. In the EU, consumers have a similar right to demand meaningful information for automated decisions under the General Data Protection Regulation (GDPR).[15] More recently, the US Algorithmic Accountability Act of 2019 dictates "assessments of high-risk systems that involve personal information or make automated decisions."[16]

The European Commission released its Artificial Intelligence Act (AIA) in April 2021, a comprehensive proposal marking a historic first step toward filling the regulatory gap.[17] AIA is a cross-sectoral regulation of AI addressing governance of so-called high-risk AI systems, generally recommending the adoption of principles in the spirit of creating trustworthy AI. Credit-scoring models are given as an example of a high-risk use case. Industry-level regulators such as the European Central Bank and national regulators have made similar recommendations.

In a similar vein, the handbook on model risk management published in 2021 by the US Office of the Comptroller of the Currency stresses the importance of evaluation transparency and explainability for risk management when using complex financial models.[18] In May 2022, the Consumer Financial Protection Bureau (CFPB) confirmed that anti-discrimination laws require companies to provide a detailed explanation to consumers when denying a credit application using ML methods.[19]

Note that the reasons for equipping intelligent systems with explanatory capabilities are not limited to issues around user rights and technology acceptance. Explainability is also required by designers and developers to enhance system robustness and enable diagnostics to prevent bias, unfairness, and discrimination, as well as to increase trust by financial stakeholders in how decisions are made. Being able to provide an explanation of why a certain decision was made has become a desirable property for intelligent financial systems.

Explanations should help users understand the system model to maintain it and use it effectively, as well as to debug it to prevent and rectify incorrect conclusions. Explanations can also serve educational purposes and help people discover and understand novel concepts in financial applications. Finally, explanations are related to users' trust and persuasion: they should convey a sense of actionability and convince users that the system's decisions are the most convenient for them.

BEING ABLE TO PROVIDE AN EXPLANATION OF WHY A CERTAIN DECISION WAS MADE HAS BECOME A DESIRABLE PROPERTY FOR INTELLIGENT FINANCIAL SYSTEMS

MANY STAKEHOLDERS, MANY NEEDS

Thus far, the XAI research community has largely focused on developing methods that reverse engineer the decisions of complex ML models, extracting relevant inputs and their corresponding contribution to predictions. These methods provide useful inputs for model developers because they enable the extraction of valuable information concerning the model's overall logic and dependence on relevant features. State-of-art explainability techniques like local interpretable model-agnostic explanations (LIME) and SHapley Additive exPlanations (SHAP) are predominantly employed by model developers as a robustness indicator, rather than information for end users and other nontechnical stakeholders.[20]

Financial organizations have many stakeholders, all with different explainability needs. They include developers (those developing or implementing an AI application), first-line model checkers (those directly responsible for ensuring model development is of sufficient quality), the managers responsible for the application, second-line model checkers (staff independently checking the quality of model development and deployment), and regulators.[21]

Trustworthy systems must target explanations for various user types and their goals and provide relevant, customized information to them. An explanation is always dependent on context: its exact form depends on what information is required (i.e., what concerns should be met) and the capacities of the person receiving the information. That principle requires a user-centered approach to XAI.

AI explanations serve a variety of purposes:

– **Legal.** For example, the EU's GDPR stipulates that a user has the right to an explanation if his or her personal data is used.

– **Trust.** End users such as financial services consumers want to trust AI solutions or better understand what they can do to better use them.

– **Performance.** Data scientists want to understand the inner workings of the model, the importance of its features, and its input-output dependencies to learn about robustness, data biases, and how the model treats biases.

– **Risk management.** Managers are interested in a high-level analysis they can understand on a business level so they feel confident they're not running a financial or operational risk. On a related note, regulators focus on customer transparency and the avoidance of systemic risk.[22]

XAI LIMITATIONS

There is currently no universal XAI solution, in part because each stakeholder type requires a unique type of explanation. This is similar to the way humans interact with other humans. DARPA's results demonstrating that advisability (users can quickly correct the behavior of a system in the same way humans provide feedback to each other) improves user trust beyond explanations is fascinating.[23] Such advisable AI systems that can both produce and consume explanations will be essential to facilitating closer collaborations between humans and AI systems in banking and financial services.

One of the challenges in developing XAI is measuring the effectiveness of an explanation. The current lack of uniform evaluation criteria for verifying the correctness of explanations necessitates a nuanced consideration of how humans react to explanations provided to them, and results showing tendencies to over-trust AI-generated explanations should be factored in when crafting explainability guidelines for AI systems.[24]

Widely employed explainability methods, including LIME, SHAP, and other prominent approaches, use input deviations to develop a surrogate model that approximates the model being examined or to examine the relative importance of individual features in determining system outputs. The resulting insights are approximative and probabilistic, lacking the certainty and completeness in understanding input-output relationships that can be obtained where direct interpretation is possible.[25]

Current limitations of explainability methods have two general implications worth emphasizing. First, the suitability of explainability methods is context-dependent. Methods differ in the kinds of insights they provide. In addition, the suitability of a particular explainability method can vary across banking models and financial domains. As a result, there is an active and growing research area dedicated to assessing how suitable various explainability methods are for financial services like credit scoring and credit-risk management.[26]

Second, the existence of explainability methods does not necessarily reduce the need to ensure that systems can be interpreted directly. This can mean choosing not to rely on certain AI systems, regardless of whether their uninterpretable is due to inscrutability or limited technical expertise.

The decision to limit model complexity for the sake of interpretability is often portrayed as a tradeoff with model accuracy. The basis for this argument is the assumption that more complex models have higher accuracy than simpler ones, which is not always true.[27]

The requirements variation for various target audiences suggests that a future tool for banking and financial services industries XAI should aim to accomplish three things:[28]

1. A rigorous, well-researched, established approach to explainability that guarantees acceptance by all addressees.

2. Step-by-step reduction of complexity levels, ranging from statistical, mathematical, and technical dependencies to relations understand-able in a financial context (this might need to be model-agnostic).

3. A customizable visualization that conveys the exact right amount of information to the banking/financial services user and regulator, facilitating an intuitive, audience-dependent understanding.

The complexity and unexplainability of AI add value beyond what humans or simple statistics can deliver.[29] By leveraging and understanding the results AI presents us, we can gain new insights, understand the problem at hand in more detail, refine our analysis methods, and further accept how this new technology might affect a spectrum of target audiences.

Finally, research has shown that the output of feature-importance methods like SHAP, through repeated queries, are prone to membership attacks that can reveal intimate details about the clas-sification boundary.[30] Such results reveal the risk that, when providing explanations to external stakeholders, the recipients of such explanations can collude to reconstruct the inner workings of a model. Robust, trustworthy AI/ML systems require privacy and transparency, so the tradeoff between explainability and privacy preservation is another major concern for financial XAI security.

AI'S POTENTIAL TO INCREASE FINANCIAL INCLUSION

The evolution in mathematical techniques and data sources is both helping highlight financial services industries' policy tensions and suggesting alternative processes and tools for managing some of these tensions.[31]

If carefully chosen, deployed, governed, and regulated, AI has the potential to increase accuracy and fairness over current statistical models by identifying data relationships that regression models cannot detect. ML techniques excel at using new sources of data to develop decision-making tools to reduce the historical biases associated with traditional data sources.

For example, data on education, behavior, and bill payment (e.g., cell phone and utility bills) can be added to credit-behavior data to create a fuller picture for credit-related decisions. Without AI, it's hard to make use of such varied information, but building models out of large, diverse data sets is where ML technology shines. The potential to turn alternative data into novel decision-making procedures is one of the main reasons AI models can improve on the fairness of traditional methods in banking and financial services.

In financial-lending contexts, studies have shown that using alternative forms of data in AI credit-decisioning models can lead to both fairer and more accurate loan decisions. TruEra, an AI quality and explainability company, and Demyst, an alternative data provider, demonstrated this in their winning submission to the Global Veritas Challenge, sponsored by the Monetary Authority of Singapore (MAS).[32]

Similarly, US-based credit agency Experian created Experian Boost, which allows consumers to add utility, phone, and other payment information to their record as a way to raise their credit score. The company claims this has increased credit availability in underserved communities.[33]

In this way, ML techniques and automated approaches can produce financial inclusion with less disparity between minority and nonminority populations as compared to manual processes for minimizing differences among demographic groups. However, some of these approaches rely on protected class information (or a proxy for it) in order to find less discriminatory approaches.

This raises important legal and regulatory questions about whether and how demographic characteristics or other protected class information are allowed for use in finding fairer models. Questions have been raised by academics, advocates, and lenders about how to choose between options that may reduce disparities among some demographic groups but potentially worsen them for others.[34]

Similarly, a recent article in *European Journal of Information Systems* builds on a case study that documents the destructive effects of algorithmic decision-making in public services by causing distress to citizens and employees, as well as financial damage to the welfare agency.[35]

Modernizing the rules that govern data access and data flows could increase clarity and consistency in banking and financial services. AI has the potential to expand markets and better align a company's purpose and brand with fairness and inclusion. Many societal segments are underserved because traditional decisioning tools deem them unworthy of credit or unqualified for employment opportunities, and if financial services companies are willing to adopt improved evaluation procedures, these disenfranchised individuals could become profitable customers and qualified borrowers.

Unfortunately, some fairness methods involve building demographic information directly into predictive models, which raises questions about adherence to fair lending laws regarding discrimination on the basis of protected characteristics. Models that rely on latent features identified by the ML algorithms (as opposed to those intentionally programmed into the models by developers) could reverse engineer applicants' race or gender from correlations in the input data or create complex variables that have disproportionately negative effects on particular demographic groups. This could lead to AI/ML systems replicating, amplifying, or introducing new sources of bias.

Eventually, the questions we're grappling with in this sector will help inform some of the public policy and larger societal questions being raised by high-risk AI/ML projects.

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BANKING'S POINT OF ARRIVAL

11 QUESTIONS TO CONSIDER FOR LONG-TERM SUCCESS

Authors

Ignacio Garcia Alves, Philippe De Backer,
and Juan Gonzalez

The model of the traditional bank we've all grown up with is no longer fit for purpose. An apt comparison is what happened to traditional news media 10-15 years ago. Seemingly overnight, the vast majority of advertising went digital. That left the pages of newspapers and magazines devoid of ads, which were their bread and butter.

If you think we're just witnessing the start of a shift to digital transformation in banking, think again. Leading banks and disruptors are already into their second or even third phase of digitization.

Legacy banks do have a few things in their favor. The first is their huge financial resources, which are second only to Big Tech. The second is a client base that remains relatively sticky, as traditional banks are still trusted to look after people's money.

Another ray of hope for legacy banks is that fintechs are swimming with a lot of other sharks. For instance, the market for payment companies is seriously overcrowded, with many players starved of capital and staring down empty balance sheets. Inevitably, this will create a bloodbath from which many non-banks won't emerge.

Although banks do have some latitude in choosing their future path, there are overarching forces by which they'll all be governed. For one, banking will largely move online, with a narrower range of hyper-personalized offerings being sold through newly evolved ecosystems like marketplaces. Banks will also need to move toward higher-value products and services aimed at previously ignored segments, like small and medium-sized enterprises.

So will legacy banks or fintechs come out on top in the long term? Despite their head-in-the-sand attitude, we believe banks might just have the edge — but their success will depend on how well they answer a vital set of questions.

QUESTION 1: DO YOU HAVE A CLEAR POINT OF ARRIVAL FOR THE INDUSTRY?

In many ways, this is the most important question of all: when you look into the future, what do you see?

If you don't have a clear industry point of arrival in mind, you'll find yourself reacting to the latest competitive threat without knowing whether it's an indicator of structural change or just a one-off. In other words, if you aren't disrupting, you're the one being disrupted, and it's not difficult to see where that disruption is coming from. The global fintech market was worth US $128 billion in 2018. By 2022, its value is expected to reach $310 billion as new entrants pile in.[1]

> **LEADING BANKS AND DISRUPTORS ARE ALREADY INTO THEIR SECOND OR EVEN THIRD PHASE OF DIGITIZATION**

[Editor's note: This article is an excerpt from the book *Disruption: The Future of Banking and Financial Services — How to Navigate and Seize the Opportunities*.]

As the traditional value chain is dissolved by these disruptors, it's being replaced by a wider financial ecosystem consisting of many niches. This is creating a world where, at least for now, capital-intensive models still coexist alongside those lighter on capital.

In this hybrid business environment, the old-school British banking model that has for so long underpinned financial services is looking increasingly irrelevant and creaky. If retail banks are to maintain any kind of position in the market, they need to turn to a balance sheet–light model that revolves around selling third-party products rather than recycling deposits into new loans. For that, they will need a very different set of capabilities.

As with any transformation, there will be peaks and troughs, but we believe this fintech disruption will continue in the long term — and we aren't the only ones. If we take market cap as a good proxy for financial resilience, we can see that the markets are more interested in looking at future value than yesterday's balance sheet.

What's happening to banks is, of course, part of a much bigger economic shift. As Anne Bennett, CEO of the National Australian Bank, says:

> The largest movie house owns no cinemas, the world's largest taxi company owns no taxis, and increasingly, large phone companies own no telco infrastructure. What, then, is the future asset for banks?[2]

Her answer? "Experience." But that's of little use if it's being applied in the wrong direction, fighting long-lost battles.

This makes understanding what the industry's point of arrival will be a key question. It's a question that requires imaginative, and perhaps painful, thinking. Although that arrival point will be different for every bank, a common requirement is that it should be far, far away from where the bank is now. If it isn't, the senior leadership team hasn't been thinking big enough.

QUESTION 2: ARE YOU FIGHTING THE RIGHT BATTLES?

If you recognize it's no longer possible to be all things to all people, where are the battlegrounds where you have an advantage or can gain one by acquiring new capabilities that will help you stand out?

A legacy bank hoping to compete against fintechs and non-banks cannot afford to dilute its resources by pursuing a hedging-our-bets strategy. Putting eggs in various baskets may work for an investor, but not a legacy bank.

Instead, you need to lead from the front by focusing on market segments where you can leverage core competencies and embrace new opportunities being created by things like open banking and embedded finance. Keep in mind that a total bank transformation should never be viewed as a side project for your IT department or something that can be solved with an off-the-shelf, one-size-fits-all solution.

Transformation means shedding long-established activities; reevaluating the levels of risk you're willing to accept; restructuring systems and processes; investing without quibble in the new technology that's needed; and appointing the right kind of leader, one who will embrace an ambidextrous model. This is the only way to differentiate yourself in a market where there's a narrowing of market share and a shrinking of spreads between low- and high-priced services.

How will you know if you have an effective strategy in place for doing what needs to be done? The simplest way to evaluate a bank's corporate strategy, of course, is to ask: "Does it work?" The glib answer is that it depends on what you mean by "working."

Performance metrics only tell half the story, since they depend on both the chosen strategy and how well it's been implemented. You need to consider other assessment indicators, like the degree of consensus among executives about the corporate goals and policies to be pursued and the extent to which you don't have to shelve planned programs or embark on cost-cutting ones (clear signs of strategic planning failure).

This should be obvious to a bank's leaders, but too often, we see precious resources deployed on a large scale without a well-thought-out purpose. Without a clear strategy, it's no exaggeration to say a bank could be heading for bankruptcy.

QUESTION 3: ARE YOU BEING SUFFICIENTLY DECISIVE AND FAST?

How quickly a legacy financial institution can realistically transform itself is one of its biggest challenges. The change you require must be undertaken now. There is no point in waiting things out in the hope that this is just some sort of ripple in the Matrix — it is not. What banks are experiencing is a complete shift of the tectonic plates.

Just look at electric vehicles. Five years ago, people thought it would be decades before we'd reach any meaningful inflection point in the market. Indeed, in Norway, 95% of new vehicle registrations are now for electric cars. The company with the clearest view of the auto industry's point of arrival is Tesla, which long ago saw an integrated world of batteries and solar panels and decided how it was going to be part of it.

Whose fault is it that banks find themselves having to move so fast? Surely not the regulators. Aren't they the ones who've been sheltering legacy banks from a full-frontal onslaught by the fintechs?

The reality is that legacy banks should have used their time under this protective regulatory umbrella to prepare for a day when it's not there. "Transform or be left behind" should have been their mantra since well before the 2008 financial crisis.

Those institutions wrongly thought they could successfully weather the storm. Today, we have left the first stage of digital transformation behind and entered a place where convergence is blurring the lines between sectors, leading to the creation of new marketplaces and making the need for speed ever more imperative.

QUESTION 4: DO YOU HAVE THE RIGHT PERSON IN CHARGE TO DO WHAT'S NEEDED?

This question is central to a legacy bank's future success. The bold decisions that are required right now mean that CEOs cannot sidestep imperatives or hide behind their teams.

If a bank is to reposition itself, it needs a CEO with the creativity, bravery, and vision to bring about real transformation. Preparing for banking's point of arrival (whatever you see it as) requires revamping the entire organization, including all front- and back-office processes. It requires trimming labor and IT costs, reducing time to market, improving agility, and bringing about greater operational efficiencies. That's a tall order in the best of times, and particularly so given the waves churned up by the pandemic.

There are few, if any, incumbent leaders who've had to deal with anything like this. One thing is certain: it can't be accomplished by a chief executive bound by old ways of doing business. What's needed is an ambidextrous leader who can deliver significant growth and productivity improvements in the short term while redesigning a bank's business model and moving it to a new place. The likes of Banco Bilbao Vizcaya Argentaria (BBVA), J.P. Morgan, and Goldman Sachs have risen to the challenge.

Banking leaders must have in mind a transformative vision that encompasses the desired point of arrival and a path for getting there that doesn't destroy the bank en route. This is quite different from being forward-looking, which involves doing little more than identifying a few industry trends and sketching out some possible responses.

Truly ambidextrous CEOs are adept at peering through a blizzard of largely irrelevant information, slicing into the complexity of others' opinions, and driving their decisions forward even when they're based on incomplete information.

QUESTION 5: DOES THE BOARD UNDERSTAND WHAT NEEDS TO BE DONE?

Do your board members appreciate that legacy models are no longer economically plausible and that investing in a multitude of businesses to see which one will flourish is a luxury bet they can no longer afford to make?

If they think we are still in a business-as-usual mode, they will end up appointing someone to run the business who thinks like them. Their collective, blinded view of the industry's future will ensure their bank remains firmly stuck in the past. They will not recruit the ambidextrous leader who's needed, defaulting to a "status quo CEO" who has experience making a universal bank perform poorly. That's the last person they need in charge right now.

How do you stop this from happening? Refresh the board by bringing in open-minded individuals representing a mix of genders, races, and experience. They must also be tech savvy, with knowledge (or at least a strong awareness) of such things as artificial intelligence (AI), machine learning, robotic process automation, and augmented reality.

To ensure their knowledge stays fresh, the board needs a true technology advocate — not just someone who "does IT." That means a board member who's not only technically competent, but someone who can explain simply and clearly the ongoing need for wholesale digital transformation.

OPEN YOUR EYES TO HOW MUCH BANKING IS BEING CHANGED BY TECHNOLOGY

If the default position of your board is to look for reasons not to spend on tech, there is cause for worry. Going digital is about far more than just having an app or customer interface that offers balance and payment features. It means having the courage to scrap the obsolete cost-and-revenue models banks have clung to for so long, replacing them with an entirely new value proposition.

Open your eyes to how much banking is being changed by technology. Look at your children or grandchildren and see how comfortable they are with their smartphones, social media apps, and online games. They're quickly becoming the ones to whom your bank must cater.

QUESTION 6: ARE YOUR CORPORATE VALUES AND ORGANIZATIONAL CULTURE RIGHT FOR WHAT NEEDS TO BE DONE?

Bankers tend to flinch at the mention of anything that doesn't have hard financial edges. Today's leaders have to think in terms of an organization's personality and culture, given that consumers now look beyond the mere mechanism of a transaction to the look and feel of the company that sits behind it.

If your culture isn't right, you're always going to lose out to the fintechs. And corporate cultural change doesn't happen by accident. Rather, it springs from an open, forward-thinking mindset instilled by the CEO.

It will be the job of your ambidextrous leader to convince everyone in the organization that the good old days of banking have gone. It's no longer about moving slowly and cautiously and never taking a risk. It's time to throw that dog-eared rulebook out the window and push fresh messages into every corner of the organization.

Sadly, many bank executives do not yet understand the impact of something like digitization and how it affects every aspect of the business, from core functions to organizational structure and culture.

We have all seen what happened at RBS, where despite the institution's massive resources, it was incapable of creating a successful digital bank. It was hamstrung by old ways of thinking that didn't match up with the new model.

Contrast that with the likes of N26 and Tandem, which broke through and achieved great things with mere pocket change. They did it with a mindset that was focused, fast-moving, and aimed squarely at meeting their customers' needs in the best way possible.

Having the right culture in place is also fundamental to recruiting and retaining staff. This is even more important today, with many once-loyal employees reconsidering their options. In April 2021, nearly 4 million Americans quit their jobs, the highest monthly figure ever recorded by the US Bureau of Labor Statistics.[3]

Almost two-thirds of employees now list corporate culture among the most important reasons for staying with their current employer — or for leaving them.[4] In fact, culture is often cited as the single best predictor of employee satisfaction, more so than compensation or work-life balance.

The cultural values and day-to-day behaviors of banks are often out of sync with those they want to recruit and retain. Too often, they fail to respect their employees, which is truly unfortunate, because being shown respect by those they work for is the thing people want most.

Is your bank a respectful organization? If it isn't, it needs to become one, especially if you're embarking on a fundamental reorganization. Lack of respect is associated with change that is ill-conceived, pursued in haste, implemented inconsistently, and vaguely communicated, resulting in little clarity about how it fits into an organization's long-term strategy.

QUESTION 7: ARE YOU INVESTING IN THE RIGHT TECHNOLOGY?

Technological obsolescence is rife in today's banking environment. Many regulators have woken up to that fact, even if all banks haven't. Those not paying attention to end-of-life hardware and software situations will find themselves looking into a funding abyss as they scramble to replace their tired IT infrastructure with something more fit for purpose.

Effective adoption of next-generation technology is the road to greater customer engagement; faster product development; better operational management; and improved compliance, efficiency, and growth. It will also enrich the customer experience through stellar, hyper-personalized service. Shifting to new technology obviously necessitates the writing off of old systems and software, but this is a cost that must be accepted. Fortunately, the cost of IT continues to fall, and the adoption of cloud-based services can dramatically cut infrastructure costs.

Banks must also become technology agnostic by using architectures for front-, middle-, and back-office processes that allow easy integration with third-party solutions and reduce dependence on legacy IT solutions.

For some banks, this is a huge mountain to climb. We were vividly reminded of that while writing this article. What happened? A very large international bank, a household name, asked for confirmation of a transaction to be sent by fax!

How many offices still possess fax machines, let alone private individuals? Rather than asking for a secure means of communication (e.g., a PDF in which information is embedded), the bank was happy with a document into which one could copy and paste anything, sent from an unverified phone number that could have belonged to anyone.

From increasing productivity and cutting costs to reaching previously inaccessible market segments and enriching the customer experience, technology makes it all possible.

Of course, given the pace of change that technology brings to every sector, predicting the future of any industry is a highly speculative venture. Who knows how emerging technologies will impact the banking sector over the next decade? Just because there's no clear or immediate picture of how this might happen, there are no guarantees that they can't or won't have an influence.

With such breakthrough technologies continually appearing, staying at the forefront of a banking segment is a challenge for even the most innovative financial institutions. Banks will have to work hard to carve out a niche through innovation and then protect it with an unrelenting commitment to high levels of service and efficiency improvement. In other words, identifying emerging technologies and using them to lever an advantage must become an iterative process.

This is no longer about adapting old tools and products with a new wrapper; it's a complete rethinking of the bank and how it operates. Going head to head with competitors that offer a lower-cost product when you have slow, obsolete systems and processes is an impossible task. Legacy banks can't compete because their outdated software doesn't allow it, and the historic web of cross-subsidies (in which profitable products prop up the unprofitable) just can't be disentangled.

QUESTION 8: ARE YOU PUTTING THE CUSTOMER AT THE FOREFRONT OF EVERYTHING?

For banks, the customer must be everything. You can slice, dice, and measure anything you want, but this is the only KPI in town.

Of course, if banks really want to serve their customers, they need to move away from thinking of them in terms of their demographics and purchase histories, which can be quite misleading about their future needs. Instead, they must use technology to acquire a greater understanding of those they do business with and use this to personalize every interaction.

State-of-the-art chatbots and other computer-supported conversation tools are now a minimum requirement. If you can apply AI to recognize each customer and accurately predict the purpose of every conversation, so much the better. If this helps you become a seamless problem solver that can offer one-call resolution, you'll save your customers time and effort, and that will win you their hearts and minds.

Given that disruptive third parties can now access customer data held by another financial institution, banks have no choice but to focus on becoming high-level, data-first organizations themselves, so they can monetize their wealth of customer knowledge. Again, this comes down to investing in the right technology and top-notch analysis.

QUESTION 9: WHAT STEPS ARE YOU TAKING TO BECOME THE INNOVATIVE ORGANIZATION YOU NEED TO BE?

Have you adopted the agile approach of a non-bank? Create quickly. Seek fast feedback. Double down on your winners. Kill your losers. Rinse and repeat.

Of course, this means you must be prepared to accept a higher degree of failure, but the rewards can be worth it. Orange Bank & Trust Company is proof of what's possible: it's able to bring out six to eight product innovations in a month, which is double what a legacy institution can deliver in a year.

According to a PwC study, leading innovators can grow at a rate 16% greater than the least innovative in sectors that include financial services.[5] So, if senior leaders haven't put a credible innovation strategy in place, their bank will have a hard time delivering the products and services their customers will be searching for tomorrow. You cannot ever be innovative enough, because the idea that once seemed ahead of its time can become mainstream in a year — or less.

QUESTION 10: ARE YOU WILLING TO SET ASIDE YOUR CORPORATE EGO?

Only the biggest banks can realistically expect to go it alone. If traditional banks are to deliver exceptional value to their customers — as they must — they have to be willing to partner with fintechs. They have the digital knowledge and experience banks need to plug the gaps in their offering.

In fact, banks must be prepared to become part of a much wider ecosystem geared toward serving the broader needs of the customer. By doing so, they will be able to turn defense into attack and better protect their position.

In such an environment, it isn't generally possible for a financial brand to stand out as it once did. Banks can, to some extent, mitigate this loss of visibility by ensuring that they play a proactive role in shaping any platform they're part of. Santander Bank has done this by launching Trade Hub, a proprietary platform that encompasses non-financial services. For many financial institutions, coming together with third parties to provide sector-specific solutions will be the only way to a long-term future.

QUESTION 11: ARE YOU READY, WILLING, AND ABLE TO MOVE TO WHERE YOU NEED TO BE?

This is the billion-dollar question.

Legacy banks must become lean, mean, fighting machines, running capital-light business models like their digital rivals. They must become ambidextrous organizations, capable of balancing immediate survival requirements with a longer-term transformation. For many, this poses an even greater threat than disruptive newcomers.

If you don't think you need to shift, everything else is irrelevant. As Winston Churchill said, "Those who fail to learn from history are condemned to repeat it."[6]

When we asked some CEOs what they saw as the banking industry's point of arrival, many said there wasn't one. They meant that it is constantly shifting, so take aim, fire, and miss is pretty much the standard process. Of course, it's how far you miss that matters. Once you've reinvented yourself, you need to do it again and again, through a constant cycle of deconstruction and reconfiguration.

As we see it, the point of arrival may shift, but it tends to stay within a certain bandwidth for extended periods (usually 10-15 years) before breaking out of these boundaries, probably because of technological change. It then settles into another position, ready for the process to repeat. We can think of universal banking as one of these phases, the rise of the fintechs another, and marketplaces probably the next. Astute CEOs will be thinking in terms of these cycles so they can be winners not just in five to 10 years, but 20 years down the road.

Having a clear picture of the industry's point of arrival doesn't mean you have to be able to see every step you must take along the way. It would be a waste of time to even try, since the only two certainties now facing any business are constant instability and the shortening of time frames for doing anything.

We're sure that when Jeff Bezos began Amazon in his garage, he had no idea of where his company would be in 25 years or the degree of disruption it would cause. How could he have conceived of Amazon collapsing the established value chain by providing buyers with an unbeatable combination of lower prices, great convenience, and fast delivery? He began with a disruptive model in mind and took it from there. After that, it was a matter of being prepared to continually adapt and seize opportunities as they arose.

But as we've seen, there are no guarantees. Even with strong will, smarts, and resources, digital transformations can fail. Sometimes this is because of slow decision-making that doesn't deliver on a vision. Sometimes there is insufficient commitment to bringing in the right people.

The path any bank takes will depend on how its leaders view the future — *banking's point of arrival* — and how they answer questions like the ones posed here. In the end, the winners will be banks that can overcome the inertia that legacy institutions have traditionally been incapable of surmounting. Bank executives: over to you.
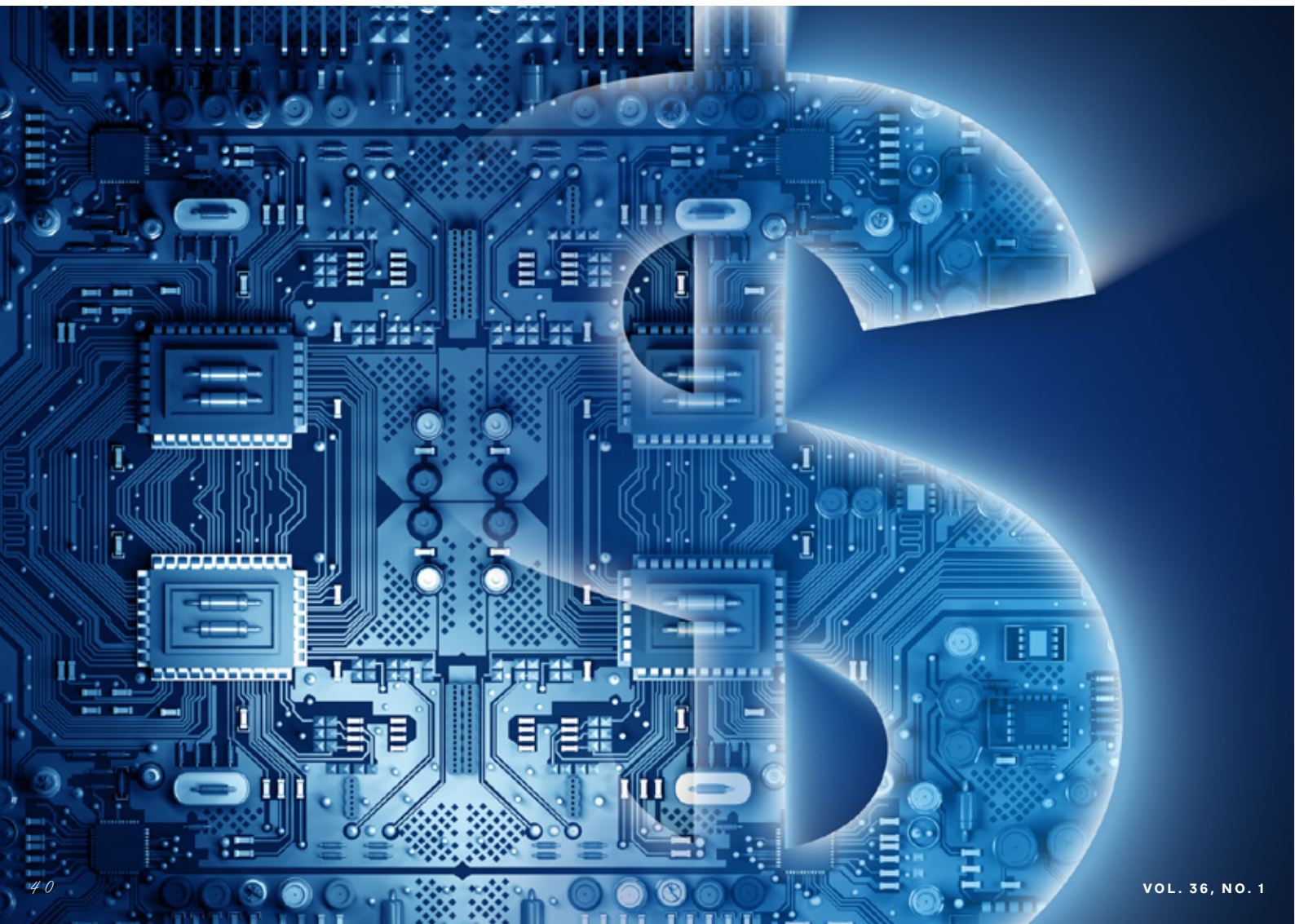
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A PRACTICAL GUIDE FOR THE DIGITAL TRANSFORMATION OF TRADITIONAL BANKS

Author

Maik Dehnert

Banking was among the first industries shaped by IT, but following the digitization wave of the 1990s, many people expected traditional banks to disappear.[1] Yet, basic banking functions changed very little — today's banks continue to provide transaction execution, pool resources, transfer economic resources, manage risk, and offer pricing information. Traditional banks have used digitization to improve their existing processes but have not undergone a digital transformation of the type that would create differentiation.[2]

Today, problems stemming from this myopic approach are becoming apparent: we have only to look at the number of legacy IT systems being used by banks, not to mention applications that haven't been updated in years. Meanwhile, the fintech revolution has led to new products,[3] and as customers spend more time on digital devices, they expect their financial institutions to have a strong mobile presence.[4] Satisfying all these needs is a tall order,[5] which is why banks need to take a much more systematic approach to digital transformation.

Banks have long used technology as a means to achieve their business goals. However, as digital technologies like cloud-service platforms, artificial intelligence, and distributed ledger gain momentum, a new level of digital agility and acuity is becoming necessary.[6]

Currently, most of the digital transformation work taking place in banks is still managed heuristically. We argue that banks (and indeed companies in every industry) should instead pursue a systematic digital transformation using systems engineering principles.

Using this approach, banks can look at value creation in a more goal-oriented manner. This will allow them to successfully transform their business models by integrating stakeholder goals and technologies across an extended partner ecosystem. Of course, this methodology must be underpinned by management optimization concepts.[7]

A SYSTEMS ENGINEERING PERSPECTIVE

A system-oriented management approach typically includes analysis, synthesis (integration), realization, execution, and evaluation.[8] These steps follow each other chronologically in traditional waterfall models but are evolutionary in Agile models. When the pressure to innovate is high, a hybrid approach allows banks to proceed to the next iteration while downstream activities are designed and implemented for the current iteration and previous development iterations are validated.

Hence, stakeholder requirements are translated into goals, activities, and system requirements and passed to parallel product and technology development. System verification, validation, and deployment of previously developed artifacts take place simultaneously.

> **AS DIGITAL TECHNOLOGIES GAIN MOMENTUM, A NEW LEVEL OF DIGITAL AGILITY AND ACUITY IS BECOMING NECESSARY**

This type of implementation leads to new organizational structures that are stronger and more stable.[9] As shown in Figure 1, successful digital strategy requires an interplay of analysis, synthesis, and realization, plus a feedback loop from execution and evaluation to reanalysis and resynthesis.[10] In volatile digital environments, these cycles can happen quickly, but they should always include all steps.

As we see in Figure 1, each activity begins with needs assessment and goal setting (analysis). It then moves into objective structuring (synthesis), product and technology development (realization), and continuous execution and output evaluation.[11] The five steps are very closely linked; imagine gears moving back and forth between each stage. In particular, synthesis and realization are very closely intertwined; they should take place mostly in parallel.

STEP 1: ANALYSIS

In the analysis step, leaders explore stakeholder requirements and formulate strategic goals. This involves collecting all high-level objectives, including all needs and constraints.[12] In this step,

it's important for business leaders to understand both the technological and processual opportunities. Each goal should state how it will satisfy the bank's future needs and how it relates to its future core business functions. Together, the goals should answer the question, "Why should the bank pursue these specific business activities in the future, and how will they help the bank provide what stakeholders need?" This analysis forms the basis for both business model development and product development, from which business activities and structures are derived.

GOAL STRUCTURING

Banks must determine which stakeholder problems digitalization can solve and work toward those solutions — all while defining the bank's future business purpose. Banks can use their corporate strategy or mission statement for guidance in defining the fundamental values for their digital transformation.

Top-line goals are typically economic; subgoals are generally based on satisfying stakeholder needs. Shareholders might focus on shareholder value or ROI, business partners might be
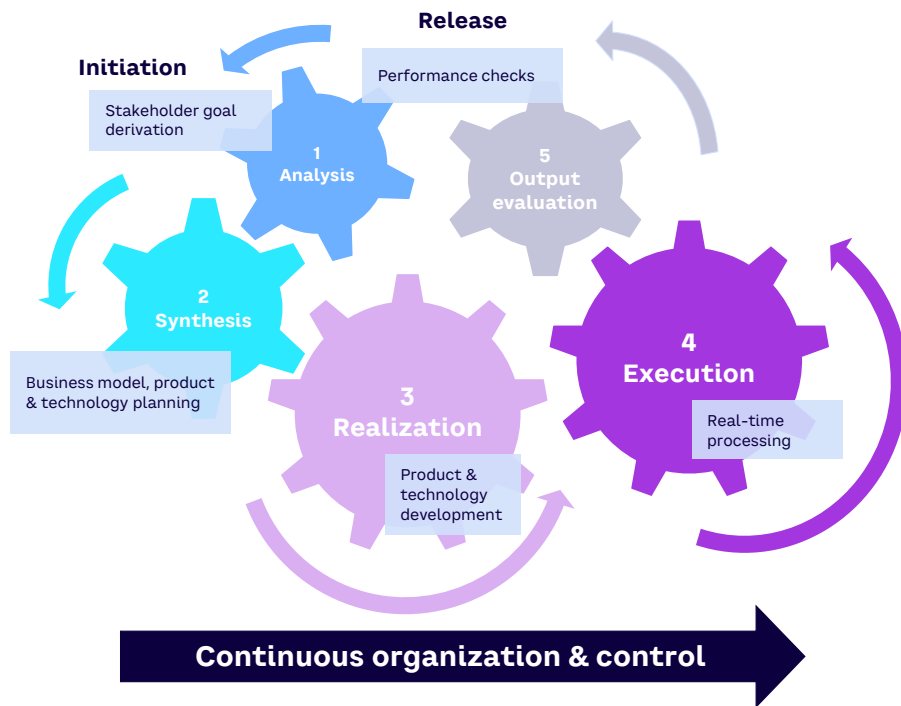

Figure 1. Digital transformation lifecycle model

interested in gaining access to resources or customers, and suppliers might want to secure their place in the supply chain. Meanwhile, customers strive for convenience and innovative products; society at large seeks sustainable, accessible, privacy-compatible services; governments look to enforce regulations and ensure public supply; and employees typically seek an optimal level of work-life balance and a sense that their work has meaning.

Because stakeholder goals can diverge greatly, a common understanding about the overall business goals is critical. Bank leaders must mesh their business expertise with their digital expertise regarding the potential effect of technologies on the business, finding a balance that fits their culture and leadership style. There is no "magic recipe" that fits all companies.

BECAUSE STAKEHOLDER GOALS CAN DIVERGE GREATLY, A COMMON UNDERSTANDING ABOUT THE OVERALL BUSINESS GOALS IS CRITICAL

Specifically, banks should create business goals in four key areas: transactions, products, sales/services, and data.[13] Business leaders should conduct workshops to gain a better understanding of business opportunities, competitors, resources, capabilities, and core competencies within each area. They also should identify the needs and wants of current and potential new customers with an eye toward which traditional business functions need to be fundamentally rethought and what new functions need to be created. Banks should also obtain a clear picture of cross-industry developments and competition as part of the goal-definition process.

STEP 2: SYNTHESIS

Synthesis involves harmonizing the business goals defined in the analysis step with technological and organizational capabilities.[14] Early on, banks need to define each solution's performance requirements, specify the functions of technological components, weigh alternatives, and validate design decisions.[15] We strongly recommend using backward induction for this: planning all the necessary steps backward from the target state and then implementing them.

BUSINESS MODEL PLANNING

Business models reflect the business's goals, including future business activities, required resources, desired revenue models, and necessary partnerships (as seen in tools like the Business Model Canvas[16]).

In this case, banks must determine which business activities/processes should be continued and what new activities should be initiated to support their digital strategy. They should also consider the potential value of partners, especially when it comes to boundary-spanning technology applications.[17] Application programming interfaces (APIs) can be used to create temporary connections, creating a partner ecosystem with clearly defined roles and activities that crosses industry bounderies.[18]

We recommend prototyping each business model and testing them on customers, using A/B testing where feasible, to gather early feedback on which solutions are the most promising.

PRODUCT PLANNING

Product planning is a complex process with no one-size-fits-all approach. Product managers create product themes that fit into business models.[19] Epics can be derived from the set of business goals and business model activities.[20] Next, epics can be decomposed into user stories and scenarios, and a product roadmap can be derived. Products can become more configurable, including by customers themselves. For example, checking accounts could become less rigid, with customers creating and deleting accounts or connecting their digital wallets to other providers in the ecosystem.

TECHNOLOGY PLANNING

Backward induction also applies to technology planning. Banks must work backward from a future end point to the present to determine which technologies will be required to reach that future.[21] They won't know the exact technologies required but should be able to conduct an in-depth comparison of available technologies to determine which seem most likely to help them reach their goals. For example, building a digital assistant requires thoroughly analyzing the bank's requirements and carefully assessing the strengths and weaknesses of various chatbot technologies.

Banks should be careful not to limit themselves to familiar technologies: digital transformation requires removing as many restrictions as possible. Instead, they should assess the potential of a variety of technologies to help them reach their goals and monitor their implementation. If no available technology matches their desired outcome, they should conduct a new synthesis iteration and (if needed) resynthesize their overall digital strategy.

Service-oriented infrastructures provide modular access to technology components, helping banks explore business opportunities more quickly. For example, cloud-based solutions offer fast access to state-of-the-art data analytics.[22] When banks are able to integrate data from various sources (e.g., internal IT, external sources, and stakeholders including employees), they create information flows that allow for fast, accurate responses to marketplace changes. These insights can strengthen existing business models and/or enable new ones.

In many cases, it makes more sense for banks to partner with companies that have developed a necessary technology than to develop it themselves. For example, in 2020, Deutsche Bank partnered with Google Cloud, dramatically shortening its route to providing cloud-based financial services.[23] This modular approach is a faster way to meet new business model requirements, but banks must, of course, carefully evaluate the resulting dependencies.[24]

Banks must integrate complex technologies into their new business processes, which may require pioneering digital innovation to address stakeholder goals. They'll need to test their technology-driven business assumptions in an iterative way, planning for the transition from the development stage to product rollout while leaving room in the process for technology shifts. Complex integration of technology into the business model requires continuous experimentation, as the technology and its components are established simultaneously. Banks should look to large technology firms like Google and Amazon as role models for creating clear strategic goals and using Agile methods to achieve them.

A bank's digital strategy must be continuously updated. Specific activities can be ascertained immediately from the hierarchy of business goals, and organizational structures can be modified or developed (including new departments or project teams). The downstream technologies can be derived from the hierarchical structure of activities and their elementary operations at the lowest level.[25]

STEP 3: REALIZATION

The realization phase is very closely linked to the synthesis phase, as the two must interact to resolve resource allocation issues. After the feasibility of the selected business activity and technology trajectory has been verified, banks can plan their business processes in detail.

In business process reengineering, business activities are integrated into business processes that run across operational functional areas. In particular, digital technologies help banks rethink business processes, potentially eliminating redundancies, middlemen, or geographic limits. Banks should make sure a variety of views are represented in their business processes, including customer types, product types, lifecycle lengths, and technology/data needs.[26]

Banks must acquire both technological knowledge and assets to successfully achieve a digital transformation.[27] In particular, the technologies must be developed, implemented, and tested across a wide range of business activities.[28] In particular, banks need to implement data engineering and analytics, IT security, and digital platform architecture. To do this, they must create and allocate resources across multiple business activities and ensure their levels are maintained throughout each activity's lifecycle. In addition to traditional life-cycle-based planning, an iterative approach can be used tactically (e.g., Agile customer front-end development). If the necessary resources are not available, product development and resource pool adjustments must happen simultaneously, making the process more complex.

Solving problems where they arise corresponds well with the agility concept of systems engineering.[29] Banks can develop information models in data engineering, then fine-tune them to the local needs of the business (e.g., data analytics models for customer acquisition and risk management). A modular business structure allows smaller business units to be quickly created, accelerating the digital transformation process.

STEP 4: EXECUTION

Banks run their transformation program during the execution stage, including installation and testing, in-service support, and upgrade implementation. At this stage, banks can identify performance issues and improve key components.[30] Management oversight is particularly intense at this stage, necessitating significant resources.

During this stage, business leaders see how digital transformation can improve business execution significantly by providing each business activity with the information it needs. For example, digital assistants can be used to answer customer queries quickly and efficiently, but this requires integration of a wide range of IT systems.

STEP 5: OUTPUT EVALUATION

Digital transformation requires banks to carefully evaluate solution performance. Individual solutions can be evaluated based on net present value (NPV), ROI, and a host of other factors.[31]

Eventually, successful digital transformation requires finding and resolving mismatches between stakeholder goals, business processes, resources, and capabilities. Banks should aim for constant coordination of the activities across the enterprise to establish internal coherence among the system elements and their specified interrelations.[32]

Figure 2 shows a digital transformation structural model that describes how a transforming enterprise system can dynamically adapt to its environment:[33]

– The **logical model** is derived from the **stakeholder goal model,** the **technology model,** and the **ecosystem model.**

– The **information** and **capability models** support the logical model.

– The entire set of **business activities** is hierarchically organized in the logical model so that a high-level process in the logical model structure manages its **subprocesses** and **elementary operations**.

– The logical model translates into a set of business processes.

– The **causal model** describes the cause-and-effect relationships (i.e., dependencies and responsibilities) within and between business processes.

– The **lifecycle model** represents the time dimension of the business processes.

– Each lifecycle defines a complete process of an activity from analysis to evaluation.

MANAGING THE TRANSFORMATION PROCESS

As they explore this model, banks must determine how far they can reasonably go in planning for future needs. Strong risk management built into the model at an early stage with planned-for iterations can help extend their reach.[34]

Complex undertakings like digital transformation become more manageable when business leaders can identify business process risks on the basis of ex ante information. Of course, some genuine uncertainties are inherent in the analysis/synthesis steps, where the predictable dimensions of customer behavior, competition, and technological evolution meet unpredictable
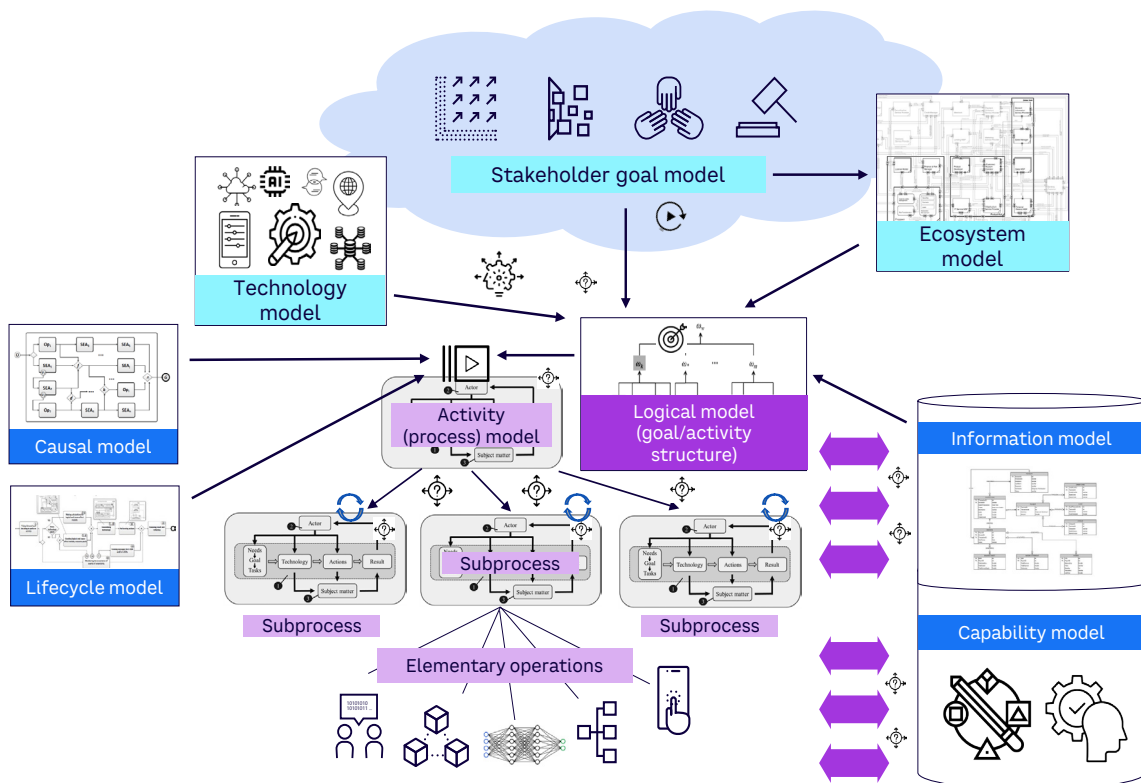

Figure 2. Digital transformation structural model

factors like black swan events (e.g., economic crises). Additionally, it's virtually impossible to predict major market disruptions due to technology change.

We suggest the following to mitigate risk during a digital transformation:

- **Use data analytics and scenario planning to identify business process risks and mitigate them to the extent possible.**[35,36] For example, data analytics can be used to forecast potential customer touchpoints. Banks should also standardize their available knowledge base through information models.[37] For instance, banks can rely on known business operators in software platform ecosystems.[38] In addition, regulatory trends are often foreseeable and sometimes can be actively influenced through advocacy.

- **Mitigate technology risk by simplifying and standardizing IT infrastructure.**[39] Banks are inclined to implement mature technologies that don't need basic R&D. Instead, banks should be developing technology and technology components specific to their needs and integrating them into business processes — so that they can become a technological first mover. Often, this can be done by combining one or more mature digital technologies in new ways.

CONCLUSION

Digital transformation can be viewed as a large-scale systems engineering problem. It can then be managed as a strategic-change program that carefully analyzes the nature of digital technologies and their specific implications on value-add activities. This approach borrows three main pillars from systems engineering:

1. Proactive business planning that aligns stakeholder goals, activities, and technologies across lifecycles

2. Continuous improvement

3. Risk management

We have observed that nonsystematic transformations are typically not sustainable. In contrast, systematic developments have the potential to advance a bank's digital transformation step by step toward its desired model while allowing for creative business planning and experimentation.

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