

Digital Banking 2025



Urs Gasser, Harvard University
Oliver Gassmann, University of St. Gallen
Thorsten Hens, University of Zurich
Larry Leifer, Stanford University
Thomas Puschmann, University of Zurich
Leon Zhao, City University of Hong Kong

November 2017

Content

	Executive Summary	3
1	Transformation Towards Digital Banking	4
2	Banking Clients 2025	5
3	Banking Operating Models 2025	7
4	Banking Revenue Models 2025	9
5	Digital Banking Platforms 2025	12
6	Data-driven Banking 2025	14
7	Banking Value Chain 2025	16
8	Consequences	18
	Literature	20

Executive Summary

The accelerating disruptive effect of information technologies (IT) on value chains and business models is abolishing existing speed limits across industries. In particular, it is forecasted to have one of the greatest impacts on the financial services sector, provoking consequences such as disintermediation, loss of earnings, and reorganization of the value chain with new actors. Banks currently face a situation similar to that of Kodak or Olivetti, for instance, many years ago. Digitization led to a fundamental transformation of their core products and value chains, which were already digital in nature.

As time-to-market for digital banking products becomes shorter and shorter, thousands of Financial Technology (FinTech) startups and other non-banks are rising to the occasion by developing new products, services, and business models for all areas of banking in payments, investments, and financing along the entire value chain, touching all areas from front to back office, as client adoption of these new services accelerates. The lighting company Osram, for example, recently had to reduce its worldwide staff from 34,000 to 26,000 due to the unexpected speed of clients' adoption of new LED technology. By contrast, a financial services company such as Wealthfront is still small, having reached almost USD 4.5 billion in managed assets. Such companies develop very quickly and establish new ecosystems with other non-banks and incumbents in the financial services industry.

Based on our previous research, we have developed theses and key questions for changes in the coming years that impact six areas comprising clients, operating models, revenue models, platforms, data and value chains.

1. Transformation Towards Digital Banking

Digitization is transforming the financial services industry. The primary drivers behind this process are the enormous developments in IT and the convergence of these technologies, such as smartphones and tablet PCs with new electronic services, i.e. crowdinvesting services or electronic banking marketplaces. These developments not only enable new business processes, but lead to completely new business models and even indicate an entire change of the banking value chain in the same way as value chains in other industries, such as the media or travel industry, were radically transformed (Ito et al., 2017). The banking industry is currently undergoing a transformation in six areas:

1. Banking clients 2025: Decreasing physical client advisory and intensified use of electronic channels forces many banks to adapt to new client processes and journeys, in order to keep client contact. Future client journeys are based on hybrid client interaction that connects client processes among different channels and even across different companies bridging the digital and the physical world. An example of this is a client journey that starts with a personal financial planning process on a tablet app guided by a digital bot, includes exchanges with other clients on social networks, contact with a client support person via video chat, and finally a visit with the client advisor.
2. Banking operating models 2025: Operating models of banks still rely on a strong vertical integration of management, core, and support processes. A recent development termed "hyperspecialization" indicates that sourced services tend to be more granular in the future and new sourcing models, such as crowdsourcing, thus emerge. Due to developments in IT (e.g., blockchain) and standardization (e.g., open APIs), banks are now able to outsource services on the level of single tasks (e.g., DNAappstore). This atomization of the value chain may lead to more decentralized organization structures as we know them today.
3. Banking revenue models 2025: Decreasing market share through intensified competition with other banks and new non-banks, a low interest rate environment, in addition to increasing costs as a result of regulatory requirements (e.g., retrocessions), all have led to lower profitability of banks. The development of new digital ecosystems enables banks to reposition themselves in the banking value chain, as well as in other value chains, and develop new revenue models. Among such examples are collaborations with other providers of innovative services, such as covesting platforms or the development of new services, such as social community platforms for banking clients.
4. Digital banking platforms 2025: New hybrid client journeys of Generation Y self-driven clients are characterized by an increasing degree of electronic client services as well as cross-company processes that will integrate clients, banks, and third party service providers over new digital banking platforms across various points of banking. These open

digital banking platforms integrate innovative services, such as social banking services, self-profiling services, or automated advisory services seamlessly into new client journeys and allow all involved parties to access the same end-user applications and data.

5. Data-driven banking 2025: Big data is an enabler of new client-related services as well as internal services with the purpose of gaining operational efficiency. An example that finds itself in the first category is cross-channel client profiles enabled by social customer relationship management systems. The growing amount of unstructured, company-external data allows banks to obtain a more complete view of their clients and to offer new services for them, such as a value chain optimization service for commercial clients based on rating profiles. An example of the internal use of Big Data is the optimization of risk management processes.
6. Banking value chain 2025: In recent years many non-banks entered the banking value chain. For example, there are technology companies such as Apple (ApplePay) or Google (Google Wallet) that disintermediate banks' client relationships by providing their services directly to clients and only use banks as transaction processing providers. Another example of this are providers that offer services without banks such as Wealthfront or Nutmeg for investments, or peer-to-peer lending in financing. These new developments indicate a shift towards new banking value chains and force banks to radically rethink their existing business models.

In order to describe the topics more precisely, the following sections outline the drivers of change and the key questions for CEOs in each area.

2. Banking Clients 2025

„The banking client 2025 is empowered by digital bots and digitally assisted client advisors.“

Recent developments in IT empower clients and lead to a fundamental change in client behavior induced by digital natives (Palfrey & Gasser, 2016), affecting existing business models and leading to different expectations of financial service providers. The first area of change is a general transformation in client behavior, such as the shift from ownership to experience-oriented, temporary usage towards the so-called "Sharing Economy" affecting all industries (Sundararajan, 2016). Examples are car2go from Daimler offering access to shared mobility services and Nextbike offering bike rental services. In the banking industry, for instance, clients share information about banking products on social networks and even share their assets to jointly create new digital banking products without banks. The second change is

the shift of knowledge from providers to clients induced by artificial intelligence technology. With digital bots that act as virtual assistants, clients now have access to almost all of the information that until now was virtually exclusively reserved for banks. Among the examples in this category is the recent victory of Google's artificial intelligence competition against the South Korean professional Go player Lee Sedol. Transferred to the banking industry, this shift leads to a lower level of physical interaction between clients with advisors, which in consequence, could further reduce human client advisors and branches. A third area of change are so-called "fluid expectations" that refer to expectations that clients derive from other interactions (e.g., if Uber allows an automated payment process, clients expect this from other services, too). These three areas of change will ultimately be reflected in digital natives as future employees, affecting not only client relationships but also leading to a change in future banking operating models (see section 3). Summarized, this client empowerment holds three transformation areas for banks:

- Digital banking self-services and automated client advisory: Bank clients intensify their use of electronic services and channels. Innovative technologies allow for more self-service and automated "robot advisory," which in the future will completely change client interaction and lead to a higher degree of automation without human interaction in many areas (e.g., Google driverless cars, IBM Watson client advisory). For example, collective intelligence allows for better investment decisions through the wisdom of the crowd compared to the expert advice of individuals. At the same time, the number of client-facing professionals (relationship managers, assistant relationship managers, and specialists) declined by 9% between 2008 and 2012 (Crosby et al., 2013).
- Hybrid, multiple provider client interaction: The increasing fusion of the digital and the physical worlds leads to so-called no-line systems (Nüesch et al., 2015). Future client journeys are based on "hybrid client interaction" that not only connects client journeys among different channels from different service providers, but also fuses the digital and the physical world. An example of this is a client walking down a shopping mall and utilizing his smartphone camera to browse through available offers for products that he just saw in the nearby shops. In order to adapt to such no-line systems, banks need to seamlessly integrate all relevant client touch points that in the future also require the integration of cross-company touch points among multiple (financial) service providers cooperating in providing full client solutions.
- Outside-in client profiling and service matching: Instead of inside-out client profiles, which very often include demographic (e.g., age, gender, etc.) and financial data (e.g., income, assets, etc.), new outside-in client profiles consider client-centric data, such as emotional value, social value, epistemic value, etc.) that can be used to individually tailor client solutions to client needs through mass customization instead of traditional client segmentation approaches. This allows clients to individually (pre-)configure their custom-tailored solutions out of standardized self- and full-service components from different service providers that can then be bundled by clients and/or client advisors to craft specific client solutions (Sachse et al., 2014).

The outlined trends towards a more digital self-service and automated advisory, hybrid, and multi-provider service bundling as well as outside-in client profiling and service matching lead to three hypotheses and key questions for CEOs (see Table 1).

Hypotheses	Key questions for CEOs
H1.1: Client interaction becomes hybrid.	What are future client needs and behaviors and what do future scenarios for hybrid client journeys look like?
H1.2: Clients advise themselves.	What is the maximum degree of self-service, what is the role of the client advisor, the "crowd" and "robot advisory," and what client profiles are needed for this?
H1.3: Clients use multiple and different financial service providers and bundle them into custom-tailored solutions.	How can financial services better be matched to client needs and how can relationships be sustained through digital services and in multi-provider relationships?

Table 1: Hypotheses and Key Questions for CEOs

3. Banking Operating Models 2025

„Banking operating models 2025 will be characterized by intelligent automation, cooperation, and industrialization.“

An “operating model” is an abstract representation of how an organization operates across process, organization, and technology domains in order to accomplish its function (De Vries et al., 2011). In contrast to a bank’s operating model, a bank’s business model describes how an organization creates, delivers, and captures value for its clients and sustains itself in the process (Osterwalder & Pigneur, 2011). While business models consider revenues, costs, and resulting profitability, operating models concentrate on costs as a primary objective that focuses on efficiency, a topic ranked among the top two priorities of banks (Crosby et al., 2013). A drop in profit margins currently challenges many banks vis-a-vis their operating models due to declining revenue margins and stable cost margins. For example, the cost margins of private banks in Asia are at the same level as in mature Western European markets (approx. 60 bp). In contrast to that Latin America and the Middle East operate with lower cost margins (approx. 40 bp) owing to the lower cost of back-office, IT, and support staff (Vandenberghe et al., 2014). In the cost category, personnel expenses represent the lion’s share and reflect the different situations regarding cost-income ratios with approx. 80% in

Switzerland, 70% in Germany, 60% in the U.S., 50% in Sweden and Luxemburg, 40% in Singapore and Hong Kong as well as 30% in China (Hintermann et al., 2014).

Besides employee costs that account for almost 60% of banks' costs, IT costs are the second largest cost block with approx. 20% (Gopalan et al., 2012). In general, banks have the highest IT costs among all industries in relation to their revenue. Compared with other industries where IT costs are predicted to fall (automotive -1%, chemical industry -3%), IT costs in banks are forecasted to rise with an annual increase of 3% (BCG, 2013). This is attributed to a high number of heterogeneous systems with an overall lifetime of potentially more than 40 years. Taken together, the following three trends characterize the developments towards new operating models for banks:

- **Increasing regulation:** Regulation addresses all areas of bank operations and is currently characterized by a convergence between onshore and offshore markets (due to stricter cross-border and domestic regulations, such as FATCA or BASEL III). A survey for the European Union, for example, estimated costs of EUR 8.6 billion from 2010 to 2015 (Pukropski et al., 2013). Many banks' project portfolios are loaded with more than 50% of regulatory project costs. The areas contributing with the most regulatory implications are risk controlling/management (56%), compliance (54%), corporate finance (52%), internal revision (32%) and IT/organization (27%). Although IT/organization is only impacted by 27%, the absolute investment amount is the highest of all aforementioned areas since processes and IT are part of all other areas, too. Adapting systems to new regulatory requirements is ranked as the number one priority in banks (Crosby et al., 2013).
- **Increasing decentralization:** Many banks have still not transformed their operating models from vertically integrated value chains to more flexible, disintegrated models that are present, for example, in the automotive industry. A major measure of the degree of specialization is the degree of in-house production related to overall value creation. Although banks do not see their core competencies in support and transaction processes, banks still demonstrate a high degree of in-house production in these areas. Direct banks for instance have an average in-house production degree of 50%, small and medium banks 80%, and big banks 70%. A major trend is that services are not only sourced on bilateral sourcing relationships, but tend to become smaller regarding their granularity (Malone et al., 2011). This trend towards "hyperspecialization" leads to completely new sourcing models such as crowdsourcing enabled through electronic service marketplaces. The U.S. company Local Motors, a provider for BMW, employs only 100 workers, while another 40,000 developers are sourced for different tasks.
- **Increasing industrialization:** The term industrialization originates from the transformation of the agricultural to the industrial society and further evolved with Taylorism. The basic principle is that high efficiency can be achieved through the identification of small, similarly conducted activities as the ones Henry Ford introduced with his mass production approach to car assembly lines. Over time, industrialization was complemented with other principles, such as standardization, automation, and quality orientation. The application of those principles to service industries is evolving, since standardization of services, such as banking products, is still not as mature as, for instance, the screws used in a car. However, the software industry in recent years has made great progress in applying the

mechanisms of industrialization to the banking industry. A survey for example, identified 700 end-to-end processes in banks, from which about half could be fully automated (Hirt & Willmott, 2014). Such services are already offered through b2b app stores such as DNAappstore or Yodlee in the U.S. These companies provide electronic service market-places for banks and providers where banks can custom-tailor their services.

Operational efficiency will become a critical source of competitive advantage for banks in the future. This will ultimately lead to operational excellence and substantiate entirely new client-centric business models. This leads to three hypotheses (see Table 2).

Hypotheses	Key questions for CEOs
H2.1: Future bank operating models are based on industrialized front-to-back processes and services.	What is the maximum degree of industrialization in banking compared to best practices in physical goods industries?
H2.2: Services are sourced on the level of single tasks (hyperspecialization) enabling innovative sourcing models.	How can services be split up into more granular pieces and which new sourcing models can be applied?
H2.3: Operating models run on multi-vendor core banking platforms.	How can bank processes and multi-vendor (core banking) application architectures be standardized to meet industrialization requirements and enable flexible sourcing models?

Table 2: Hypotheses and Key Questions for CEOs

4. Banking Revenue Models 2025

„In 2025 we will see entirely new revenue models in banking.“

Traditionally, the business model of a bank was very simple. As an intermediary it offered a lower interest rate to the depositor and a higher interest rate to the borrower. The bank's margin was the interest rates differential minus its costs. Alongside this simple model, banks developed additional products from which they receive additional revenues from their clients. Examples of basic products are bank accounts and deposits, debit and credit cards, as well as transactions conducted through them. More sophisticated products include custom-tailored products, such as structured products. In contrast to other industries, such as the legal industry, banks do not usually charge clients for advisory services. Instead, most banks include advisory costs in their product costs that are very often received as kickbacks from third-party providers.

Currently banks are challenged by decreasing revenues on the one hand and increasing costs on the other. This forces banks to identify new revenue models. In general, three different

types of revenue models can be identified (Osterwalder & Pigneur, 2011). First, a title passes from the seller to the buyer. In this asset sale the buyer pays the seller and the service ownership is transferred from the seller to the buyer. In a second revenue model, the title stays with the seller, but a usage, subscription, renting, or licensing fee is paid by the buyer. The third model is the so-called middleman model where the intermediary pays a brokerage or advertisement fee to the seller. All of these revenue models can be combined with either fixed (e.g., list, featured, volume based, segment discriminated) or dynamic (negotiated, auction, real-time, yield management) pricing strategies.

With digitization, banks can develop new revenue models. A survey identified that more than one-third of the digitization impact on banks could influence the revenue side (Olanrewaju, 2014) and most European and U.S. banks have shifted their priorities toward revenue growth over the coming years (Ernst&Young, 2016). Another survey showed a similar result with an estimated impact on 40% of revenues (Busch, 2013). Among the drivers of change in revenue models are more models used per company, new and other potential revenue streams, shrinking revenues due to commoditization of products, and increased importance of revenues acquired via electronic channels:

- More, new, and other potential revenue streams: New banks (e.g., Atom, Moven, Fidor, etc.) and non-banks as new competitors very often offer the same products in a more convenient way and in many cases even for a lower price. Betterment, for example, charges 0.15 percent annually on assets of USD 100,000. Additionally, the increased use of comparison sites, such as moneysupermarket.com in the UK finally led to higher transparency in the market and results in lower prices (Hirt & Willmott, 2014). Although there are no exclusive private banking comparison sites available at the moment, such a platform could quickly evolve. For example, in the media industry, increased competition finally led to completely new revenue models (e.g., usage, licensing, and brokerage fees), where traditional actors and new competitors cooperate, or where client-based subscription models (subscription fee) were replaced by provider-based advertisement models (advertisement fee). In Austria for example, Google announced to offer free electricity to clients in exchange for access to their data. A similar trend towards free banking services could also evolve in the financial services sector, if a community of clients attracted other providers to pay for services and thus subsidize their bank accounts and deposits.
- Shrinking revenues due to commoditization of products: Banking products are digital products, thus differentiation with other products is difficult. Financial products become commodities due to the developments in IT, which lead to a higher degree of automation and virtual representation of banking products. One example are credit cards, which can be used to purchase goods online or via a mobile device without any manual interaction. The cards are no longer shipped physically, but stored in the client's E-Wallet on his mobile phone. The same commoditization process appears in investment products where investment decisions are based on crowd-intelligence and in many cases provide better solutions than custom-tailored ones by individual client advisors. Due to virtualization, automation, crowd- and robot advice, banking products become interchangeable among banks (another provider and/or product is just "a click away"). Finally, commodities lead to lower revenues. Some banks, for instance, offer bank accounts, cards, etc. without charging any fees. This trend could ultimately lead to new revenue models where banks offer all their basic products and transactional services free of charge and instead focus

on high excellence advisory services that are charged at a premium.

- Increased importance of revenues over electronic channels: A survey among bank clients showed that clients want to be more involved in their banking services (Ernst&Young, 2016). In the UK for example, a recent survey indicates an increase of execution-only business in investment services from 10% to 50%. And 70% of those surveyed would even provide personal information to banks if they saw the benefits as clear and transparent. Although client advisors today still account for 64% of all revenues, this relationship is expected to trend towards more electronic services and decrease to approximately 30% within the next years (Roland Berger, 2013). Along with this trend comes the specialization of new banks and competitors on certain channels and, in some cases, even points of banking. Moven for example, is a mobile bank while Fidor's core asset is its social banking community and the digital banking platform. In contrast, most banks do not offer the same portfolio of products and services on their electronic channels as provided on their physical ones. Many non-banks follow the trend towards hyperspecialization and only offer individual activities, such as P2P-payments.

New revenue models are key to differentiating the competition with other banks and non-banks. In the future, they must be built around client advisory and hybrid customer-bank-interaction. This leads to the the following hypotheses (see Table 3).

Hypotheses	Key questions for CEOs
H3.1: Future revenue models are based on cooperation and are inverted from a customer-centric to a provider-centric logic.	What are the key design principles of cooperation-based and provider-centric revenue models?
H3.2: Clients will pay for excellent client advisory services, while basic products and transactional services will be free of charge.	How must client advisory services be designed in the future to become accepted and paid for by clients?
H3.3: Full price transparency for clients and innovative pricing models will increase revenues.	To what extent can banks provide price transparency for their clients, how does this affect client loyalty, and what role do innovative pricing models play?

Table 3: Hypotheses and Key Questions for CEOs

5. Digital Banking Platforms 2025

„2025 banking platforms will be open and interoperable and designed from front to back.“

Banks' IT costs depend on the bank's size and range from 4.7% to 9.4% (Gopalan et al., 2012). The absolute amount can reach up to EUR 3 billion at HSBC or EUR 2.6 billion at Deutsche Bank (Lodge et al., 2013). In contrast, insurance companies, for example, spend only up to 3.3% and airlines up to 2.6% of their revenues on IT. Although banks invest the highest amounts in IT, they are not among the leaders in innovation of customer-related services. A survey among banks identified that banks rank innovative electronic services in customer interaction with priorities ranging from 48% to 86% (depending on the service category in payments, investments, financing, advisory, etc.), but fall short on their implementation, which ranges only from 0%-17% (Kohlmann & Puschmann, 2014). A similar survey found that only 20% of global private banks offer online wealth planning services (Crosby et al., 2013). The primary reason for this is a lack to adopt new processes and systems, although some partial concepts regarding strategy have been developed.

In general, banks' IT investments vary depending on the business area. While back office transactions, corporate and investment banking together account for an average of 72% of all IT costs, front office investments only sum up to about 28% (Moormann & Schmidt, 2007). This is due to very often old and heterogeneous IT architectures in banks' back offices and applications that require significant investments into their operation and further development due to regulatory requirements. Banks' major systems are core banking applications that are defined as "the sum of all IT components that allow a banking institution to develop, process, and manage its basic financial products and services effectively" (Balgheim & Ollagnier, 2005). These core banking applications, such as Avaloq, Finnova, SAP, Sungard or Temenos for example, were designed to handle large amounts of transactions in back office processes for basic financial products and services, such as bank accounts, deposits, etc. But they still only provide limited functionality in front office processes, client-facing activities, and innovative customer services for digital banking platforms, although many providers have started to enhance their functionality in these areas, too ((Hunt, 2013), (Greer & Narter, 2012)). The major trends in digital banking platforms are:

- Digital banking services: In recent years, a broad range of new digital services in customer-related processes have emerged (e.g., (Newton, 2016)). These services encompass all banking processes in payments, investments, and financing as well as advisory services, financial information and cross-process areas. Among relevant examples are E-Wallets that allow clients to replace all elements of their physical wallets with electronic substitutes, such as credit and debit cards, loyalty cards, etc. An example of such a solution is ApplePay. Other examples include activities ranging from investments (Covesting), financing, (P2P lending), advisory services (social advisory services where clients

advise other clients), and financial information (e.g., crowd-based financial information (see also (Puschmann, 2017))). In combination with innovative technology, such as e.g., Bitcoin's blockchain, digital services can be distributed as unique items and can be secured in terms of duplication and access. Importantly, these digital services have to be seen in the context of clients' behavioral shifts, which in general require a different future service design (see section 2).

- Open banking APIs: Many core banking application providers started to publish or even completely open their Application Programming Interfaces (APIs) for third party service providers (so called "Apptrepreneurs"). In the first case, other providers can develop new, complementary services as part of the core banking application. In the second case, core banking providers supplement their applications with an app store-based service marketplace, which allows third-party service providers to directly offer their services to core banking providers' clients. Examples of the second strategy are DNAppstore or bancbox. Whereas these examples focus on b2b services, Crédit Agricole focuses on b2c services with its CAsStore.
- Standardization: A major challenge of new digital customer services is their lack of interoperability and standardization (e.g., (Palfrey & Gasser, 2012)). If for example, a client uses Wealthfront's investment application, that client cannot integrate it with the client's bank's depot and, for instance, obtain an overall view of all investment products and their performance. Standardization communities, such as BIAN, the "Open Bank Project" (openbankproject.com) or "OpenID Connect" try to solve this by providing standards for technical services. But as of now there are no applications available that allow multi-provider and multi-application access and allow clients to obtain a transparent overview of their investments and financial products. The U.S. company mint.com, for example, enables clients to integrate multiple bank accounts into a single interface and initiate payment transactions.
- Blockchain: The blockchain, Bitcoin's technology, as well as other distributed ledger approaches (e.g., Ethereum) are another important digital platform development that could spur standardization and allow for improved multi-provider processes and applications. Compared to the existing financial infrastructures that are centralized and controlled by banks and other regulated financial intermediaries, the blockchain is a decentralized approach that automatically records all clients' transactions in real- or near real-time. Each participant holds a copy of this ledger that ensures the transparency of all transactions. Instead of transactions among different actors being transferred to one central clearing institution and then being settled on all actors' internal ledgers, blockchain allows transactions to be settled immediately, with everyone involved seeing the transaction on a distributed ledger. Some of the major challenges are technical issues such as scalability and privacy, as well as a lack of trust, collaboration and governance (Iansiti & Lakhani, 2017). Currently, many financial service providers are experimenting with the blockchain in different areas such as in payments (e.g., Bank of England's RSCoin) or investments (e.g., Nasdaq for pre-IPO trading on its Private Market), etc.

A digital banking platform integrates all relevant services for clients, banks and non-banks, and is a key enabler of digitization and transformation. The following hypotheses summarize relevant aspects of digital banking platforms (see Table 4).

Hypotheses	Key questions for CEOs
H4.1: Clients, banks, and providers operate on the same banking platform.	Which new business and operating models (e.g., make vs. buy) for digital banking platforms will be relevant and how do banks position themselves strategically?
H4.2: Clients, non-banks, and third parties provide their own services for digital banking platforms.	How will services be provided by clients, non-banks, and other third parties and how can those actors be attracted to join and use digital banking platforms?
H4.3: Digital banking platforms operate on open APIs, standards, and distributed ledgers and integrate services from multiple banks and providers.	How can digital banking platforms integrate different actors such as clients, banks, non-banks and providers?

Table 4: Hypotheses and Key Questions for CEOs

6. Data-driven Banking 2025

„Data-driven banking will allow banks to develop entirely new business models and products and optimize their processes.“

Data-driven banking is closely related to the term “Big Data.” The increasing amount of data and the availability of new technologies provide for new possibilities in banking. The use of data in banking is not new. In the 1980s and 1990s, banks already used historical data in data warehouses to better understand and manage their businesses. But data was also used as an driver of new businesses. For example, in 1999, the availability of granular trading data was an enabler of high frequency trading, after the U.S. Securities and Exchange Commission (SEC) officially authorized electronic exchanges in 1998. In the past years, Big Data entered a next stage of development driven by an increasing amount of (client) external company data and the development of new technologies that allow for easier analysis of unstructured data.

Data-driven banking addresses both efficiency gains in operating models and more effective client interaction that generates new revenues. An example of the first area comes from the British government, which employs a new “behavioral insights team.” This team identifies areas of data-driven applications to save money in existing processes. An example of this are the text messages that the team sends to people who are in default of their tax payments with a statement that most of their neighbors have already paid their taxes. Another example addressing new services in client interaction comes from ING bank in the Netherlands. ING advises its clients regarding optimizations of their value chains. For this, the bank analyzes all actors up- and downstream of a certain value chain, compares, for example, credit

ratings etc. with other financial and company data, and suggests the “ideal” company for stock-keeping within this value chain based on this analysis. Since modern stock-keeping is very often outsourced, ownership can be flexibly changed and costs be made variable.

Although the potentials of data-driven banking are diverse, only a few companies already apply these concepts. In other industries, two-thirds of the most innovative companies frequently generate new products and ideas for growth from Big Data mining (Ringel et al., 2017). Companies using data-driven decision making are on average 5% more productive and 6% more profitable than their competitors (McAfee & Brynjolfsson, 2012). But a study identified that only 8% of all surveyed companies have already realized projects in this area (Jarke 2014). And regarding banks, only 37% have gathered first experiences with Big Data prototypes or pilots (Coumaros et al., 2014). This not only applies to the use of external data sources such as social media etc., but also to already existing, transactional data for predictive analytics that many banks still do not leverage (e.g., analyzing which client would be suitable for a certain product because of his or her characteristics). Although practical experience is still low, two drivers have the potential to push the relevance of data-driven banking in the near future:

- Increasing amounts of data. The amount of data generated by search engines, web-based trading, and social media increases by an additional average data volume of 2.5 exabytes per day (increasing volume) (McAfee & Brynjolfsson, 2012). The total amount of data increase is approximately 20% per year (Hilbert & Priscila, 2011). Additionally, this type of data becomes more diversified (increasing variety). Walmart, for example, handles more than 1 million customer transactions every hour over its databases containing more than 2.5 petabytes of data. Although data volume is high in b2b processes, approximately 70-80% of all new data is generated by consumers who predominantly create unstructured data. Facebook, for example, handles about 50 billion photos. And this unstructured consumer data holds enormous value for banks that currently gather client data primarily via client relationship managers. Now, banks could use more client-generated data that would allow them to enhance their existing knowledge in areas like credit rating, etc.
- Innovative IT-tools to analyze huge amounts of data. In contrast to traditional data warehousing applications that operate on relational database management systems combined with desktop statistics and visualization tools, data-driven banking is based on the convergence of different technologies as a core enabler. A primary category of this technology encompasses sensor-, geo- and other data created by applications as part of the “Internet of Things” (e.g., smartphone apps like Google Maps, etc.). A second category includes applications for unstructured data search, such as video or voice search. Third, tools for sentiment analysis and predictive analytics are able to semantically analyze unstructured text e.g., from social media and identify patterns. Fourth, with real-time technologies, such as quantum or in-memory computing companies can analyze huge amounts of data almost in real- or near-time. Finally, cloud technology, such as cloud-based grid computing, distributed computing power, and applications among different companies enable banks to use different kinds of technology more quickly. A supporting role comes from technologies, such as storage, integration, visualization, and security.

Data-driven banking is an enabler of improving efficiency, client interaction, and developing new services and business models. This leads to the following hypotheses (see Table 5).

Hypotheses	Key questions for CEOs
H5.1: Data-driven banking allows banks to reduce costs in operating processes due to improved transparency and better decisions.	Within which operating processes can data-driven banking reduce costs and which data is necessary to achieve this?
H5.2: Data-driven banking allows banks to collect more data about their clients, improve their quality, and develop new services.	Which external client data can be collected and used, how can this data be combined with internal data, and which new services can be developed?
H5.3: Data-driven banking allows banks to build new business models and to become data brokers.	Which new business models can be developed out of data-driven banking approaches and how can banks become data brokers?

Table 5: Hypotheses and Key Questions for CEOs

7. Banking Value Chain 2025

„There will be no isolated banking value chain in 2025; instead we will see new cross-industry ecosystems“

Changing client behavior and the innovative application of IT have a strong transformational potential on value chains. Among the prominent examples are the computerized reservation systems in the travel industry, the ordering systems in the pharmaceutical industry, the electronic home shopping systems in retail, in addition to the electronic stock markets in the financial sector. In a more recent example, the convergence of the media, computer, and telecommunications industry has replaced the traditional physical distribution of content and physical media, such as CDs, books, and DVDs as well as many of the physical stores. A major actor in this shift has been Apple Corporation, which is not only a manufacturer of hardware solutions, but has also become the world’s largest distributor of multimedia content and software. Apple has used the potential of disruptive technologies, such as the MP3 format, mobile user devices (iPhone, iPad), and electronic markets (iTunes, AppStore) to transform the media industry. These disruptive technologies often feature inferior performance in the early stages of their evolution (e.g., flat screen TVs first had a lower resolution than conventional tube TVs) and their potential is typically underestimated (Bower & Christensen, 1995). This transformative potential of IT on business models and value chains can especially be observed in service businesses in general (Osterwalder & Pigneur, 2011) and in the banking industry in particular ((Tallon, 2010), (Puschmann, 2017)).

Although the mentioned examples relate to many successful companies from different in-

dustries, such as Kodak, Grundig, or Commodore Computers, all of them missed the opportune moment to rethink their business models and existing value chains. Business model innovators like Google or Amazon revolutionized entire value chains by overcoming the traditional thinking in dominant logic from a single company and industry perspective, by focusing on radical business model innovation instead of incremental product innovation (Gassmann, 2014). Skype, for example, is the largest telecommunications provider worldwide even though it does not operate its own network infrastructure – How can this dominant logic be broken up in banking? Although the last two decades have seen multiple visions for “banking in the future” (e.g., (Evans & Wurster, 1999)), until now banks were successful in defending their established models in most areas. This paper supposes that three major drivers have become sufficiently prevalent to stimulate a stronger transformation of the banking value chain in the coming years:

- Non-banks emerge as new competitors: While banks still concentrate on exclusively managing individual client relationships in face-to-face contact, new competitors such as online investment communities and peer-to-peer (P2P) business models are emerging. These FinTech innovations are mostly provided by new actors for the areas of all financial client processes (Puschmann, 2017). Among the examples are multi-banking services, such as Mint, covesting services, such as Covestor, or investment services, such as Wealthfront. The new actors position themselves at different locations within the banking value chain, and have the potential to reduce banks’ market share in banking businesses such as investments and financing or even completely disintermediate banks.
- Cross-industry ecosystems: Currently the lines between established industry sectors are blurring and digitization may lead to a re-definition of the well established Standards Industrial Classification System (SIC) that defines industries such as e.g. “Retail Trade” or “Finance, Insurance and Real Estate” as clear separated industries (Puschmann, 2017). Examples of such new cross-industry digital financial services are on-demand insurance for the Sharing Economy or payment services for cross-mobility services. Just as the internet evolved from an internet of information and internet of services in the last decades, the internet of values will allow clients and organizations to exchange money and other values (e.g., virtual currencies, loyalty points, etc.). For this, trusted financial services will play an important role.
- Changing regulatory requirements: The pressure to be compliant with a high number of regulatory requirements is increasing on a national and on a global scale. For banks, there is a need to identify profitable and varying services towards clients. Among the strategies are industrialization approaches and the development of innovative solutions that support clients more intuitively in general and that offer profound advice. This ultimately leads to large, highly efficient banks (transaction processors) on the one hand and profitable niche banks (advisory and product banks) on the other, but eliminate undifferentiated banks “in the middle” (Hedley et al., 2006). On the other hand, many countries started to introduce new regulation schemes that apply lower barriers for start-up companies. Examples are Singapore, the UK, and Switzerland.

The drivers and scenarios indicate changes across the entire value chain and lead to the following hypotheses for the banking value chain 2025 (see Table 6).

Hypotheses	Key questions for CEOs
H6.1: The current value chain will divide up banks and non-banks into more specialized entities.	How can analogies from other industries be used to assess the impact of digitization and changing client behavior on the banking value chain?
H6.2: Non-banks will take over parts of value creation and market share.	What are business models of non-banks, which banking processes do they cover with which market share, and what can banks learn from these new participants?
H6.3: Banks are able to re-position themselves with new business models.	What will future digital banking business models look like and what kind of innovation governance is required for implementing digital banking business models?

Table 6: Hypotheses and Key Questions for CEOs

8. Consequences

The developments in the aforementioned six areas could lead to an entire reorganization of the existing national and global banking system. The consequences for the banking industry can be structured along the innovation degree (incremental vs. disruptive) and the core banking processes (back office vs. front office) and may result in four major patterns (see Figure 1):

First, banks provide secure custody and transaction services as one of their core competencies since their evolution as financial institutions. Currently, many examples in the area of cyber risk demonstrate that the custodian function could be of increasing relevance for societies in the future. Examples are the storage of health or governmental data, etc. Banks could develop their competencies in this field and incrementally optimize their custody and transaction capabilities as well as develop new services for this area and to position themselves as a “Digital Custody and Transaction Bank 2025.”

Second, although banks already operate complex IT infrastructures, the emergence of new blockchain-based environments could challenge the status quo soon (Ito et al., 2017). Over the past decades, banks have heavily invested in their back office infrastructures to meet increasing regulatory requirements and automate their internal processes. Currently, new initiatives based on blockchain infrastructures may lead to new infrastructures making those investments obsolete and requiring collaboration between incumbents, start-ups, and regulators to define standards and regulation governance (WEF, 2016a). For this, new roles such as a “Digital Blockchain Bank” may evolve.

Third, many banks currently increase their digital banking capabilities based on their existing IT infrastructures. As described in this paper, the adoption rate of digital banking services is still low. In contrast to start-ups, banks could use their existing client base and thus leverage

their services to them. The emergence of core services like digital identity (WEF, 2016b) combined with digital advisory services will soon allow clients to conduct their financial services wholly online and support the development of a “Digital Advisory Bank 2025.”

Fourth, banks have deep knowledge in complex banking products and processes that are implemented in existing IT infrastructures. Although the new FinTech start-up companies provide innovative solutions for many areas, most of them still require transaction and custody processes that banks have provided as core competencies for centuries. Thus, future ecosystems could evolve as the cooperation of FinTech start-ups and banks and lead to an entirely new “Digital Ecosystem Bank 2025.”

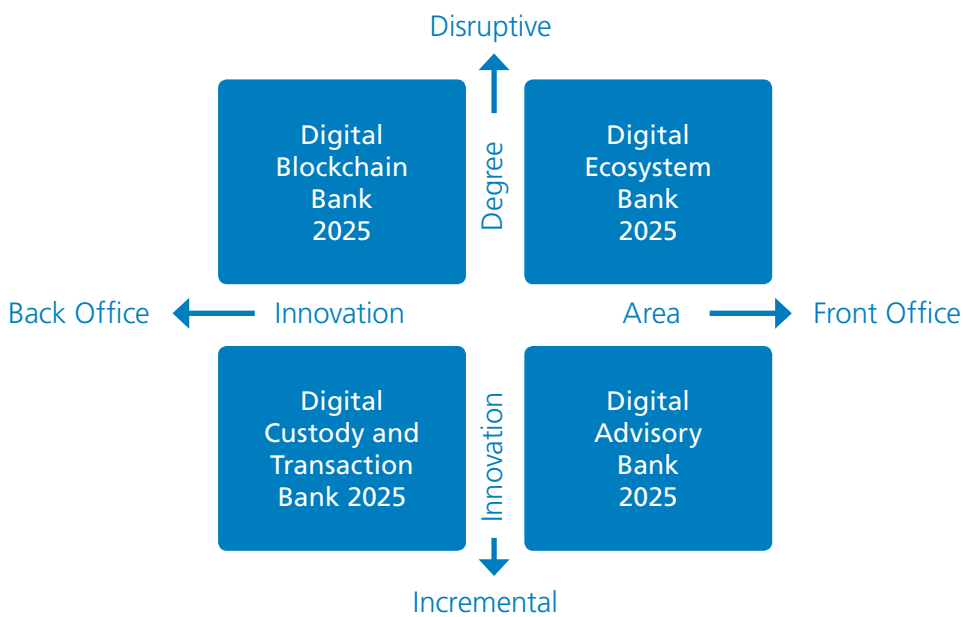


Figure 1: Digital Banking Models 2025

Although the transformation in the banking industry presents great challenges for the status quo, it contains many opportunities for those companies that face them. Still, many view financial technologies such as blockchain only as new “transport systems”, similar like the change from tape-recorded videos to youtube videos. But as history has shown, the conversion towards new infrastructures very often leads to a fundamental reconfiguration of the status quo. Independent of any success or failure of single companies, the transformation of the industry is changing the nature of banking 2025 as a core part of today’s global economy. We should therefore heavily invest in research on this evolving future financial system.

Literature

Balgheim, T., & Ollagnier, J.-M. (2005). *Redefining Core Banking: Worldwide Survey*. Wall-dorf: SAP.

BCG (2013). *BCG Retail Banking Performance Index*. Boston: The Boston Consulting Group.

Bower, J. L., & Christensen, C. M. (1995). *Disruptive Technologies: Catching the Wave*. *Harvard Business Review*, 73(1), 43–53.

Busch, W. (2013). *Banking 2020 - A Critical Balancing Act: US Retail Banking in the Digital Era*. Dublin: Accenture.

Coumaros, J., Buvat, J., Auliard, O., de Rois, S., Kvj, S., Chretien, L., & Clerj, V. (2014). *Big Data Alchemy: How can Banks Maximize the Value of their Customer Data?* Paris: Capgemini.

Crosby, C. S., Jensen, J., & Ong, J. (2013). *Global Private Banking and Wealth Management Survey 2013*. London: PricewaterhouseCoopers.

De Vries, M., van der Merwe, A., Kotze, P., & Gerber, A. (2011). *A Method for Identifying Process Reuse Opportunities to Enhance the Operating Model*. In *IEEE International Conference on Industrial Engineering and Engineering Management*. Singapore.

Ernst&Young (2016). *Could your Clients' Needs be your competitive Advantage?* London: Ernst&Young.

Evans, P. B., & Wurster, T. S. (1999). *Strategy and the New Economics of Information*. *Harvard Business Review*, 75(5), 13–34.

Gassmann, O (2014). *The Danger in missing the Innovation Moment*. *Financial Times*. Retrieved from <http://www.ft.com/cms/s/2/b2ef363c-31c4-11e4-b377-00144feabdc0.html#axzz3Chly5Pep>.

Gopalan, S., Jain, G., Kalani, G., & Tan, J. (2012). *Breakthrough IT Banking*. *McKinsey Quarterly*, 26(2), 30–35.

Greer, S., & Narter, B. (2012). *Core Banking Solutions for Large Banks*. New York: Celent.

Hedley, K., White, J., Cormac, P., dit de la Roche, C. P. & Banerjea, S. (2006). *Banking 2015: A Classic Strategy Battle of Scale vs Focus*. *Strategy & Leadership*, 34(3), 51–58.

Hilbert, M., & Priscila, L. (2011). *The World's Technological Capacity to Store, Communicate, and Compute Information*. *Science*, 332(6025), 60–65.

Hintermann, C., Christe, A., & Laarmanen, T. (2014). Performance of Swiss Private Banks. Zurich: KPMG.

Hirt, M., & Willmott, P. (2014). Strategic Principles for Competing in the Digital Age. McKinsey Quarterly, 50(3). Retrieved from <http://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/strategic-principles-for-competing-in-the-digital-age>.

Hunt, R. (2013). Core Banking Systems for the Large Bank Market. Arlington: CBS.

Iansiti, M., & Lakhani, K. R. (2017). The Truth about Blockchain. Harvard Business Review, 95(1), 118–127.

Ito, J., Narula, N., & Ali, R. (2017). The Blockchain Will Do to the Financial System What the Internet Did to Media. Harvard Business Review, Digital Article. Retrieved from <https://hbr.org/2017/03/the-blockchain-will-do-to-banks-and-law-firms-what-the-internet-did-to-media>.

Jarke, M. (2014). Applied Big-Data-Research. Business & Information Systems Engineering, 56(5), 333–334.

Kohlmann, F., & Puschmann, T. (2014). Banks are aware of technological Innovations, but respond too slowly. St. Gallen & Zurich: Competence Center Sourcing in the Financial Services Industry & Swisscom.

Lodge, G., Jegher, J., & Zhang, H. (2013). IT Spending in Banking: A Global Perspective. New York: Celent.

Malone, T. W., Laubacher, R., & Johns, T. (2011). The Age of Hyperspecialization. Harvard Business Review, 89(7/8), 56–65.

McAfee, A., & Brynjolfsson, E. (2012). Big Data: The Management Revolution. Harvard Business Review, 90(10), 60–68.

Moormann, J., & Schmidt, G. (2007). IT in the Financial Services Industry. Berlin: Springer.

Newton, A. (2016). Hype Cycle for Digital Banking Transformation. Stamford: Gartner Group.

Nüesch, R., Puschmann, T., & Alt, R. (2015) Hybrid Customer Interaction. Business & Information Systems Engineering, 57(1), 73-78.

Olanrewaju, T. (2014). The Rise of the Digital Bank. London: McKinsey & Company.

Osterwalder, A., & Pigneur, Y. (2011). Business Model Generation. New Jersey: Wiley & Sons.

Palfrey, J. & Gasser, U. (2012). *Interop: The Promise and Perils of Highly Interconnected Systems*. New York: Basic Books.

Palfrey, J. & Gasser, U. (2016). *Born Digital: How Children Grow Up in a Digital Age*. Revised Edition. New York: Basic Books.

Pukropski, U., Mayer, M., Sommer, D., Wiechens, G., & von Zanthier, U. (2013). *Implications of regulatory Requirements*. Frankfurt: KPMG.

Puschmann, T. (2017). Fintech. *Business & Information Systems Engineering*, 59(1), 69-76.

Ringel, M., Taylor, A. & Zablitz, H. (2017). *The Most Innovative Companies 2016*. Boston: Boston Consulting Group.

Roland Berger (2013). *The Future of Retail Banking in Europe*. Munich: Roland Berger Strategy Consultants.

Sachse, S., Alt, R., & Puschmann, T. (2014). *Towards Customer-centric Mass Customization - Contribution of a Customer Model*. In *Proceedings of the 8th Multikonferenz Wirtschaftsinformatik*. Paderborn.

Sundararajan, A. (2016). *The Sharing Economy: The End of Employment and the Rise of Crowd-Based*. Cambridge: MIT Press.

Tallon, P. P. (2010). A Service Science Perspective on Strategic Choice, IT, and Performance in U.S. Banking. *Journal of Management Information Systems*, 26(4), 219–252.

Vandenberghe, F., Wenger, F., Lacroix, S., Olanrewaju, T., Widmer, C., Libotte, G., Briot, T. & et al. (2014). *McKinsey Global Wealth Management Survey 2014*. Brussels et al.: McKinsey & Company.

WEF (2016a). *The Future of Financial Infrastructure: An ambitious Look at how Blockchain can reshape Financial Services*. New York: World Economic Forum.

WEF (2016b). *A Blueprint for Digital Identity: The Role of Financial Institutions in Building Digital Identity*. New York: World Economic Forum.