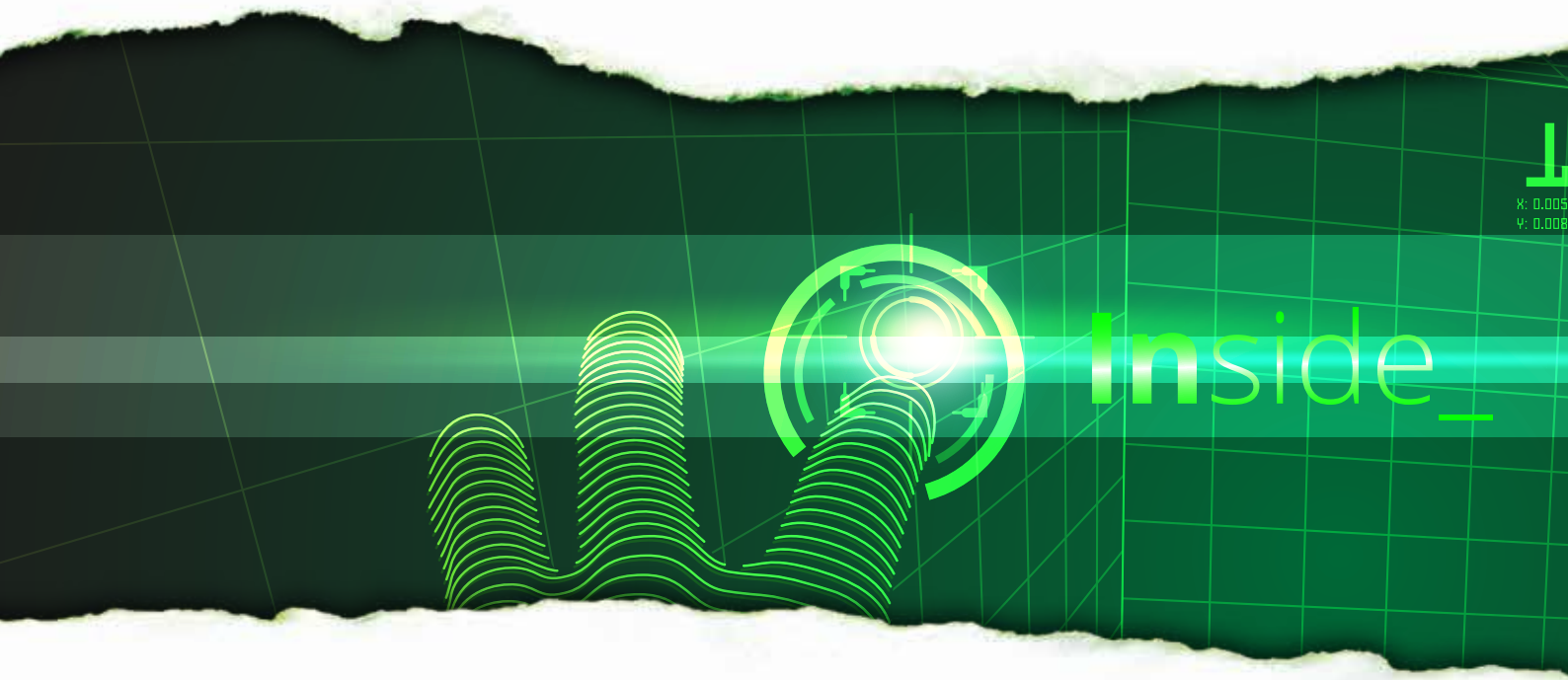
Inside

Triannual insights from Deloitte

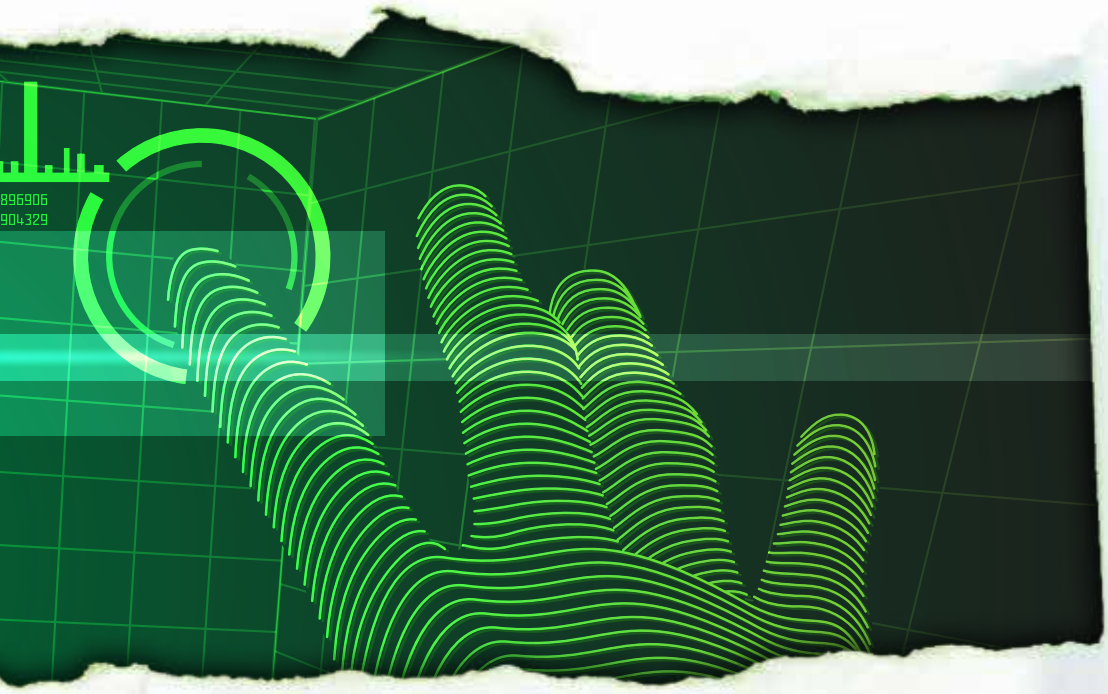
Issue 19
October 2018

Deloitte.

CIO EDITION 2018



Keep your eyes peeled


896906
904329

In this issue

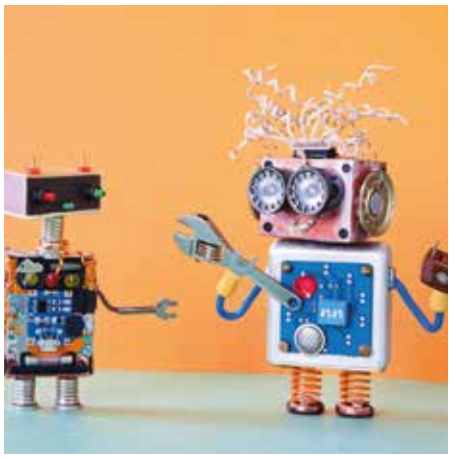
Page 14

Page 28

Page 36

Companies are confronted with a changing environment and need to respond to challenges...

Page 56



Page 76

Page 98

Foreword

Deloitte Luxembourg
560, rue de Neudorf
L-2220 Luxembourg
Grand Duchy of Luxembourg

Tel: +352 451 451
www.deloitte.lu

Dear readers,

It is with great pleasure that we introduce the nineteenth edition of Inside magazine dedicated to Chief Information Officers. As in previous years, we will present different technology hot-topics that are revolutionizing the financial market and changing the way businesses operate, whilst providing you with the tools needed to keep up with advancements and be prepared to face today's challenges.

In a world where the financial landscape is constantly evolving, companies must strive to achieve a competitive advantage, obtaining a better and stable position within the marketplace. The best way for companies to achieve a competitive advantage and overcome challenges generated from sources such as digital transformation, increasing regulatory pressures, and the ever-morphing corporate and consumer focus, is through innovation. These demanding factors will also come from emerging and maturing technologies, as it is expected that technology will disturb the sequence of the value chain and in turn combine value chains in a more complicated manner.

In order to support CIOs in navigating through these challenges and provide decision makers with an international vision, Inside is proud of unveiling its second EMEA FS Technology edition in partnership with the Deloitte network and external contributors. We hope this edition will help CIOs and equip them with the knowledge and insight to not only be able to face upcoming changes, but also to lead and initiate them.

This latest edition is also an opportunity for us to announce that **change is in the air** for our next publication of Inside. As we aim to continuously improve our readers' experience, we are delighted to announce a transformation on the horizon with the release of the twentieth edition. **Keep your eyes peeled, Inside is regenerating!**

We welcome you to this edition and as always, we look forward to receiving your views and comments!

Joël Vanoverschelde
Partner
Advisory & Consulting Leader

Pascal Martino
Partner
Strategy, Regulatory & Corporate Finance
Deloitte Digital Leader for Luxembourg

Margaux Bauwens
Senior Consultant
Operations Excellence & Human Capital

Editorial

Dear readers,

We are pleased to share with you this second EMEA Financial Services Technology edition of Inside magazine. In previous years, our publications have offered you insightful articles with a look at our leading practices as well as trends and opportunities in the financial services industry. Our last CIO-focused issue highlighted three aspects: how new technologies have changed the client/provider relationship; how organizations need to keep up especially in terms of digital innovation; and finally the necessity of client confidence in systems technologies offered to them.

This year, we aim to show CIOs concrete examples of how companies can be at the forefront of digitization, the integration of new technologies and the transformation of core applications.

Our issue adopts two perspectives that highlight both innovative thinking and practical analysis:

The innovation and digital perspective focuses mainly on the challenges of combining the traditional vision of financial players and core applications with the current digitization. In a market where FinTechs, empowered customers, and Open Banking rule the roost, only digitizing front-facing services is not an option anymore. As a rule of thumb, businesses should consider their digital transformation strategy at the beginning of a project.

The core transformation and technology perspective focuses on specific processes, methodologies, and technologies that companies may find beneficial if integrated into their business. Some of the technologies are, to name but a few, blockchain with its tokenization, robo-advisors or the rise of cognitive automation.

It is important to understand that even if investing in new technologies can seem a daunting task, businesses need to take the plunge to ensure their competitive edge. Choosing the right technology for your company means choosing the right system that not only delivers the capacity you need today, but can also meet tomorrow's expectations.

We hope our articles will help you in successfully driving the companies you are working for and will give you tools to anticipate changes in the future.

Patrick Laurent
Partner
Technology Leader &
EMEA Financial Services
Technology Leader

Sébastien Genco
Director
Technology & Enterprise
Application

Allison Izard
Consultant
Technology & Enterprise
Application

Part 01

From an innovation and digital perspective

Prospery, Wealth Management Reinvented

René Theunissen
Partner
Consulting—Technology
Deloitte

Nicolo Comparini
Consultant
Consulting—Technology
Deloitte

An interview with COO Omar El Khamlichi Prospery GmbH, subsidiary of ABN AMRO

Two years ago, the Board of Dutch bank ABN AMRO decided to create challenger banks: innovative value propositions outside the existing bank to create new businesses supported by a new IT infrastructure. One of their challenger banks is a digital wealth manager. Deloitte supported ABN AMRO with the design and setup of this new digital private bank. René Theunissen and Nicolo Comparini of Deloitte Consulting in the Netherlands met with Omar El Khamlichi, the COO and CIO of this new wealth management startup, for an open interview in their Amsterdam office. Their office is in typical startup style with open spaces, customer journey drawings and post-its on every wall, and a foosball table next to the meeting room—totally different from a traditional bank.

Deloitte: What is Prospery and how is it unique compared with other players in the Wealth Management industry?
Omar El Khamlichi: Prospery is a fully digital wealth management platform—the very first player in the European private banking market to offer the most important private banking services in a natively digital fashion.
From the very conception of Prospery, our focus has been on creating a mean to make our customers happy and satisfied. In turn, every customer journey we design has this very idea at its core. It drives every key decision we make and it shapes our long-term direction. An example is our pricing, which is a capped pricing; another example is to make our financial advisers directly available to our customers, with no intermediary sales person.

Deloitte: What was the reason behind ABN AMRO setting up Prospery?
Omar El Khamlichi: ABN AMRO spotted a major trend in the Wealth Management arena; customers' needs and regulators' requests are gradually adjusting to the new digital scenario. As technology advances in parallel, new means become available to accomplish ambitious goals. ABN AMRO saw an opportunity for a new organization that could combine cutting-edge technology with the expertise of an established bank.

Deloitte: What about the existing private banks? To what extent does Prospery differ?
Omar El Khamlichi: Our proposition and engagement strategy are entirely different. For example, all private banks aim to help their customers achieve their goal, but we do it differently. In order to do this we focus on analytics, expertise, and customer engagement to make this possible. We have less focus on offering a wide range of banking products.
We also reward employees in a different way; a lot of emphasis is put on helping our customers accomplish their objectives. There are no KPIs on revenues and financial results for Prospery. In addition, Prospery is born as a purely digital player, which means everything revolves around customer journeys, automation, and simplified processes. This allows us to offer high-quality services at a fraction of the cost borne by a traditional player.

Deloitte: How did it start? What was the assignment that the executive board gave to you?
Omar El Khamlichi: We got a strategic instruction from the executive board to build a new digital wealth management platform for private banking customers in the European market. It was crucial to identify the correct segment to avoid focusing on small-sized niches. It must be pointed out that the board's message provided a clear direction, but did not in any way limit our freedom in articulating every aspect of the proposition.

Deloitte: How did you first approach the assignment?
Omar El Khamlichi: After an initial refinement of the proposition, we created three work streams: one focused on customer validation and a market-entry approach, one handling the operational and regulatory aspects, and one building the technical platform and managing the SaaS solutions. We continuously aligned these streams and got everyone—including internal players, our partners, and vendors—working toward the same goal.

Deloitte: All right, let's dig into these three streams. Starting from the business proposition, how was the market segment identified?
Omar El Khamlichi: Through our initial market analysis, we identified some major customer pains that are not addressed by the current players. We also started understanding that the majority of private banking customers use only a fraction of the products available on the market. Only a small niche requires marginal services. We therefore decided to tackle the largest share of the pie, focusing on a limited set of core services that are able to appeal to most users. This approach allowed us to retain speed and reduce complexity, while still being able to serve a high percentage of customers.

Deloitte: How did you come up with the name and brand?
Omar El Khamlichi: We first ran customer interviews to get a feeling of market perceptions and to start testing out some of our options. We quickly figured out that people were looking for something new, but at the same time they needed the reassurance of an established brand. Therefore, we opted for a co-branding strategy and, after a few sessions together with a specialized partner, we narrowed it down to Prospery. Prospery is a new name for a new, fresh player that gives hope and wealth (prosperity) and is supported by a trusted bank ABN AMRO—hence the subtitle "an initiative of ABN AMRO."

Deloitte: Moving on to the organizational aspects, how is Prospery organized?
Omar El Khamlichi: It is a flat organization, with no hierarchical layering. This was done on purpose to ensure everyone feels complete freedom to make a difference. In terms of skillsets, we have multidisciplinary teams, featuring different backgrounds and capabilities. Having two offices, in Amsterdam and Frankfurt, we ensure communication through weekly meetings and daily standups, when necessary. The goal is to keep the communication chains as short as possible, so that everyone can quickly find each other.

Deloitte: How did you create the Prospery culture?
Omar El Khamlichi: By sharing the same big ambition and ensuring that everybody moves toward the same goals. Everyone is focused on making the impossible possible. A crucial role was played by senior management of the (IT) parties who have been personally involved in the project steering meetings and who showed terrific commitment, were constantly motivated, and encouraged their respective teams. In addition, I think that similarities in terms of age and career stages of the employees and partners that worked on Prospery helped to create an inspired, driven, and pleasant environment. Social meetings were the cherry on top, cementing the bonds within the group.

Deloitte: Let's now explore the technical platform itself. How many partners and IT vendors did you get on board? And why?

Omar El Khamlichi: Since our goal was not to build an off-the-shelf solution, we needed specialized capabilities that were spread over a broad range of vendors. This proved to be a successful strategy. In fact, being on the cloud and implementing a state-of-the-art API ecosystem, we can now quickly leverage the innovation roadmaps of our partners and continuously integrate their advancements into our products. For example, in order to engage customers with our financial advisers, we can leverage the chatbot and video technology investments made by our SaaS partners. It is important to highlight that to efficiently incorporate these benefits, your platform must be designed for flexibility and low cost of change.

Deloitte: Speaking of the cloud(s), how do you make this work? And how do you ensure security?

Omar El Khamlichi: The key point is starting to focus on the main architectural principles right from the beginning, during the design phase. We decided to shape our platform with three values in mind: fast integration, change, and security. These principles guided most of our technical decisions. Of course you need a broad and deep skillset to convert these principles into an actionable plan; here, the support we received was crucial, both from internal ABN AMRO experts as well as from our external advisers, such as Deloitte. In the technical architecture and security areas, for example, IT architects and information security specialists at both ABN AMRO and Deloitte brought in a lot of knowledge and experience to design and test the platform to work across different cloud platforms and in a way that is compliant with the bank's security requirements.

Deloitte: It must have been a challenge to coordinate such a large number of parties. What are the ingredients for success?

Omar El Khamlichi: Our way of working was based on a scaled agile and lean approach, promoting flexibility and speed. One of the key components was to have people onsite, sitting and working together. This is something we have emphasized from day one. Although it required some investments like travel expenses, this approach definitely paid off. You could clearly see the boundaries between different entities becoming thinner, and cooperation turned out to be way more effective.

Deloitte: Let's now analyze the startup/corporate relationship in more detail. What are the pros and cons of being a startup of a big organization?

Omar El Khamlichi: Predominantly I see a lot of benefits. Being backed by ABN AMRO, you are provided with a strong brand that can support you with both customers and partners. Also, it allows you to reap the benefits of in-house resources. Legal knowledge, product development, security know-how, buying power: these assets were not part of the team but we could count on them when needed.
On the other hand, an established organization comes with a larger rulebook—something that is not always relevant within a startup-like environment. Risk is perceived and measured in different ways and this can affect the length of the analysis phase. Truth be told though, the degree of freedom we received was outstanding.

Deloitte: How do you pump the innovation back into the existing organization?

Omar El Khamlichi: We use three methods. One, we challenge the parent's policy and procedures, helping them rethink their approach in light of our simplified processes. Two, we support them in reusing and integrating the technology we develop, bringing it to other parts of the organization. Three, we organize ad-hoc events to share, understand, and discuss Prospery's story, with the goal of identifying new innovative opportunities.

Deloitte: Can you share Prospery's biggest achievement and challenge?

Omar El Khamlichi: Our biggest achievement is that we matched our ambition; we managed to create a truly unique digital private bank in 10 months, starting from scratch. We successfully put together all the technical, legal, compliance, and organizational requirements—including a banking license—and it is now all up and running in a real organization.
Our main challenge is now to transform this great product into a known player in a large market. We need to build people's awareness and confidence in our offering. It takes time to get in touch with our potential customers and show how these services can help them achieve their dreams.

Deloitte: To conclude, what advice would you give to a CIO/CEO who wants to build a challenger bank?

Omar El Khamlichi: Keep the team at a distance from the large organization; this will give them enough room to challenge the status quo and minimize political influences. Also, do not give the team your solutions, but rather ask questions and stimulate discussions. Remember that the focus is on innovating and on creating a dynamic mechanism that is made to produce continuous innovation, rather than simply launching the project and a new product. Although it will take time, the benefits should not be measured in financial terms only; a lot of value lies in the innovation boost that you will be able to deliver.

And of course, give Prospery a call! We are always happy to help.

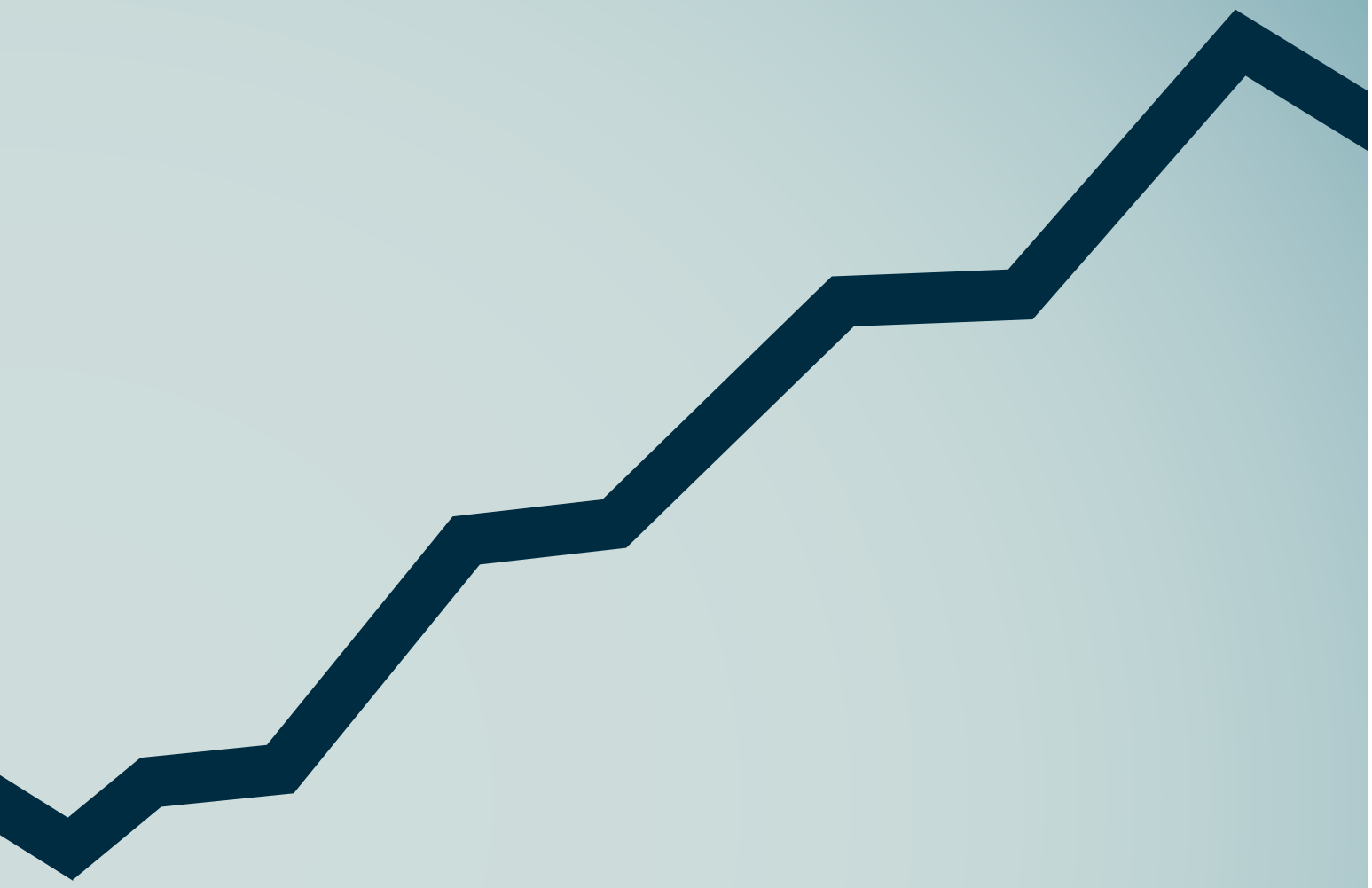
Your bank isn't digital, unless it's digital at its core

Thys Bruwer
Director
ENS
Deloitte

Karoly Kramli
Associate Director
ENS
Deloitte

Heidi Custers
Senior Manager
ENS
Deloitte

Dustan Daniel
Manager
ENS
Deloitte



Many banks are showcasing their digital capabilities through immersive apps and chatbots, but their core banking systems are still antiquated, slowing down fulfilment and forcing customers through complicated processes. In a world where nimble FinTechs, empowered customers, and Open Banking regulation is becoming the norm, having a digital front-end is simply not enough.

In his book, The Fourth Industrial Revolution, World Economic Forum founder Klaus Schwab said, "There has never been a time of greater promise, or greater peril." This statement, more than any other, describes the pressure banks currently find themselves under. While rapid advancements in technology have provided the platform for banks to "go digital" quicker and cheaper than ever before, massive regulatory shifts like PSD2 (Revised Payment Service Directive) and GDPR (General Data Protection Regulation) are forcing banks to transfer their power—and sometimes their competitive advantage—to their customers.

It is this "Promise versus Peril" that often causes inertia. Many incumbent banks do not know where to start, so their investment is piecemeal and unfocused. The harsh reality is they need to start at the core to truly call themselves "digital." Too many core banking systems, even the ones claiming to be digital, are monolithic and product-focused; they are simply not nimble enough to allow banks to compete with the plethora of FinTechs that are transforming the marketplace. If your bank is implementing Agile, upgrading interfaces, and striving toward integration, but still relying on a traditional core banking system to do so, digital transformation is going to be a lengthy and costly exercise filled with compromises on what matters most: the customer experience.

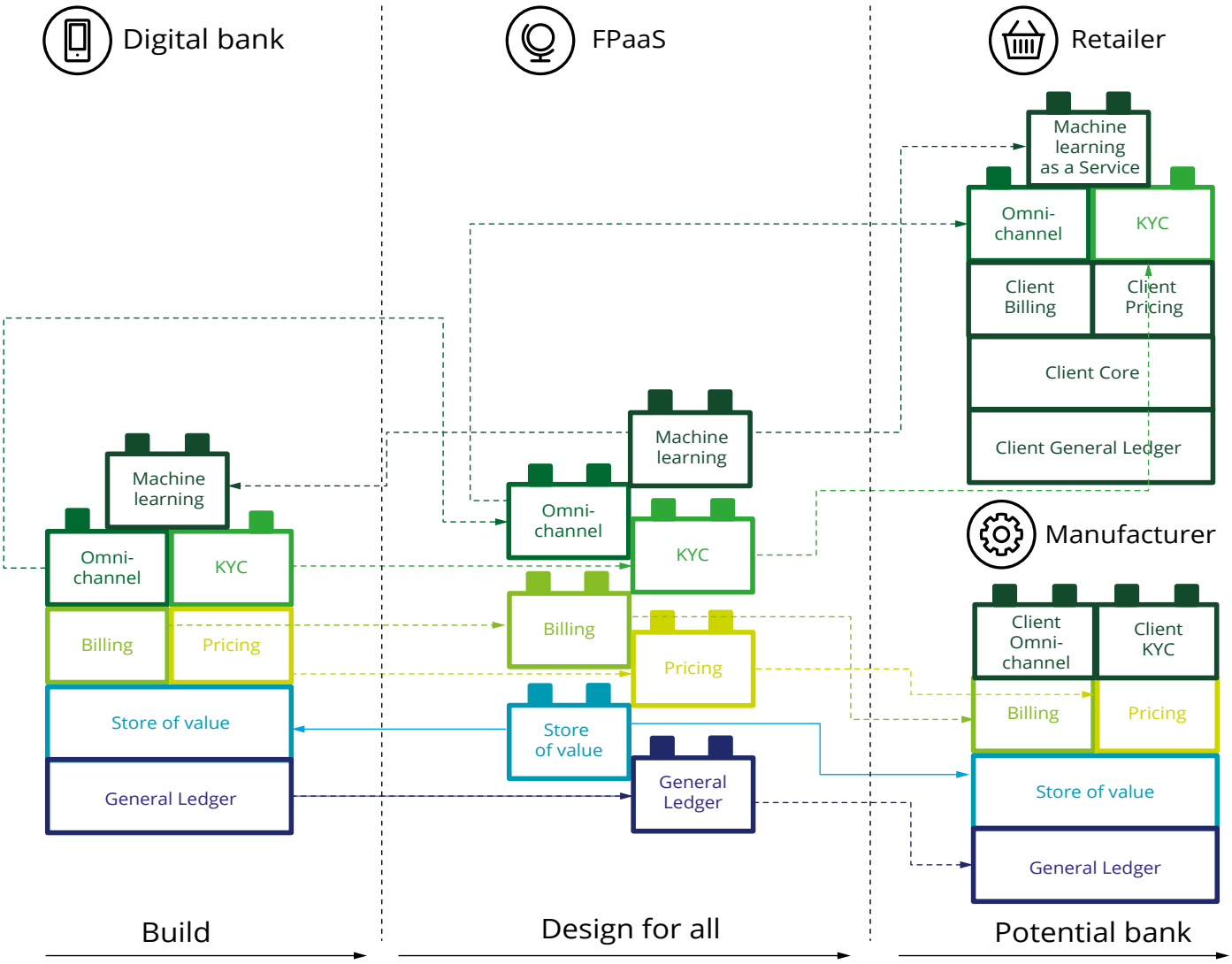
Financial providers that will win in this disruptive market are able to make customers feel like their journey is unique and that their bank knows what they want before they need to ask. To make this real, the core needs to be adaptable and open, and scale at will without increasing cost-to-income ratios.

Enter The Single Store of Value. This next generation core banking architecture is completely componentized and leverages artificial intelligence and big data, thereby allowing the bank to "plug in or plug out" functionality at the most granular level with minimal disruption to the status quo, using a mesh of dynamic Application Programming Interfaces (APIs). Your bank can provide a single account to which all of its products are linked. Intelligent rules and process engines are used to provide unique customer configurations, so that the business can offer an infinite number of different products without significantly increasing its infrastructure or cost base. This is known as the "Product of One" principle.

APIs designed as microservices provide more than just a great banking experience. The Single Store of Value lays the foundations for a bank to evolve into a Platform-as-a-Service business. In fact, The Single Store of Value is a microcosm of the Platform-as-a-Service, forming one of the main pillars of the self-same platform. By monetizing APIs and partnering with complementary market players, one could create an entire financial ecosystem that is interoperable and infinitely scalable. Providing the platform for FinTechs to plug into converts them from competitors to partners, and creates a wealth of insights across the value chain, enabling intelligent business growth through diversified revenue streams.

Financial Platform as a Service

Digital banks and FPaaS can co-exist in the same business and leverage the strengths of one another to create a financial solution for customers that meets all their requirements:



It is this “Promise versus Peril” that often causes inertia. Many incumbent banks do not know where to start, so their investment is piecemeal and unfocused.

To convert the traditional core architecture, your bank needs to adopt an agile strategy, governed by a set of sound, interconnected digital principles. **Some examples are:**

Product of one

Through the assembly and intersection of key digital technologies such as analytics, automation, and rules-driven orchestration, customers are able to define the financial products they need by stipulating the features and attributes of those products backed by a common infrastructure.

System of insights

Everything in the ecosystem needs to be treated as a potential source of data that can be used to derive value, glean insights, and inform decision-making, and in so doing leverage high quality data.

Intelligent autonomy

The platform needs to ensure that the core business and technology processes are automated and digitized wherever possible through the use of process automation, orchestration, and workflows.

Componentization

Technological platforms need to be componentized to provide the agility required to quickly adopt technical and functional capabilities of new technologies with minimal disruption to the status quo.

Deployment flexibility

Leveraging the latest cloud infrastructure and approaches creates a foundational platform that lowers the cost to serve. Deployment flexibility is key to establishing white labeling, and multi-tenancy capabilities allow for a shared base to be established, resold, rented, reused, or provided to support different use cases.

Adaptive security

Building in security features and establishing an adaptive security architecture along with analytical solutions enables financial institutions to comply with regulations such as Basel 2, Sarbanes Oxley, AML, IBAN, and KYC.

Leveraged artificial intelligence

Applying cognitive capabilities with high quality data is a critical component of the digital ecosystem. Banks will be transformed by the use of AI and its ability to drive limitless scale and contextual experiences, and augment bank employees to provide superior customer experiences.

Open API-enabled

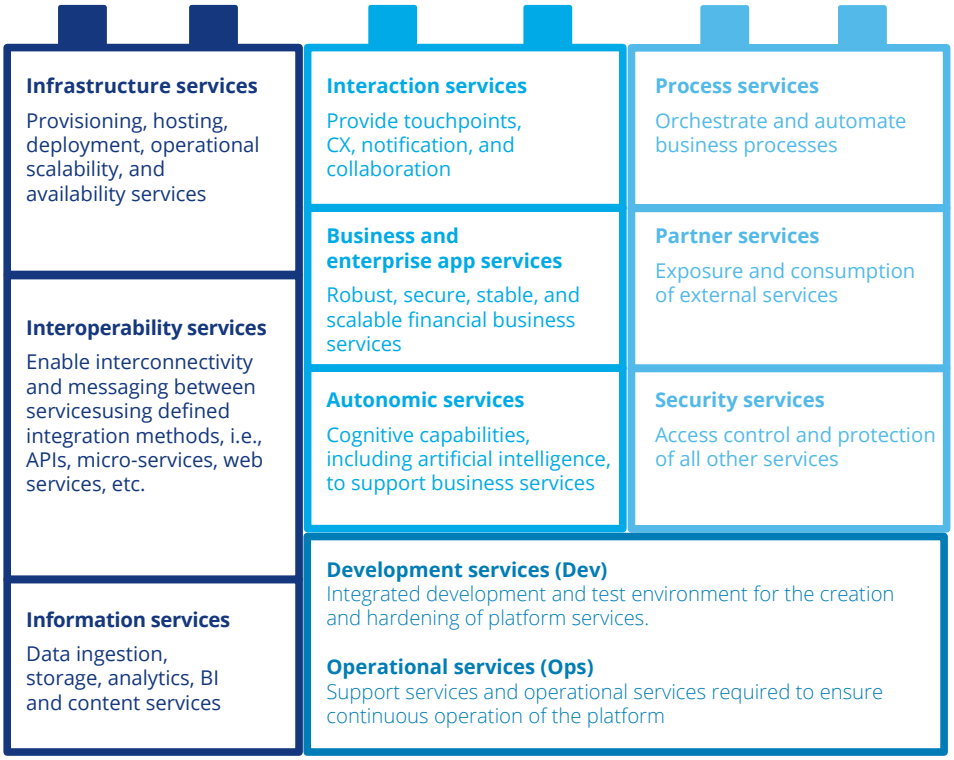
Establish a service repository of open APIs that provides interoperability and access to services that are faster, highly secure, standards-based, and reusable.

Fit for purpose

Acknowledge the incumbent technical debt resident in software today and focus on establishing a digital financial platform that achieves low-cost fulfilment to cater for financial inclusion of all without passing the cost on to the customer. Select technologies that are designed with a specific set of non-overlapping responsibilities and avoid technical debt.

Digital platform services model

The platform services model is a representation of technical stack layers and services that are required to realize the multi-tenant capable financial platform:



The Single Store of Value concept is so compelling it is rumored that even the large core banking technology providers are reconfiguring their systems to component-based architecture.

The digital core is a scalable, resilient platform that allows for the development of financial products and services to be exposed within and across the ecosystem. The Single Store of Value brings third-party developers, FinTechs, partners, and financial institutions together to create innovative applications that will enhance financial services and change the way we all manage our money.

The Platform as a Service model, using the underlying concept of The Single Store of Value is already making waves worldwide. "YONO" (You Only Need One) is an integrated digital financial platform offered by State Bank of India (SBI) that enables users to access a variety of services such as banking, investments, taxi bookings, online shopping, or medical bill payments. Even more alarming for traditional financial service providers is MTN, Africa's largest mobile network operator. MTN is on its way to fulfilling its vision to be the largest bank on the continent through, among other avenues, a retail and payments Platform as a Service called Jumia. Additionally, retail juggernaut Amazon is leveraging its platform-style architecture and digital core and could potentially become the largest bank on earth overnight.

The Single Store of Value concept is so compelling it is rumored that even the large core banking technology providers are reconfiguring their systems to component-based architecture. Whether they will actually license that functionality on an individual basis remains to be seen. For now, banks will have to forge their own path, and we predict that the first organization to successfully implement The Single Store of Value and monetize it on a Platform as a Service will begin a wave of disruption and platform consolidation that could transform the entire industry.

For all the technological wonders that enable this renewal in financial services, it is still important to recognize that banks are businesses with people. To undergo a successful digital transformation, the organization needs to transform its culture from a fear-based to one that fails fast and embraces experimentation. It needs to prepare and train its people for new ways of working. To truly thrive in the digital world, it needs to transform its entire business model with the understanding that even its revenue model changes when data becomes its primary product, and that in becoming a platform business, the range of its clients change to include even banking competitors. It is therefore critical to undertake a holistic approach when implementing digital transformation.

Conclusion:

- Rampant disruption, technological advancements, and shifting regulation in financial services is putting traditional banking models in extreme peril
- Monolithic core-banking systems are holding organizations back from truly realizing their digital potential, resulting in poor customer experience and costly technical debt
- The Single Store of Value concept allows banks to become truly "Digital at the Core" through a mesh of dynamic APIs, enabling them to evolve into Platform-as-a-Service businesses that are nimble enough to seize opportunities and own the financial ecosystem
- The Single Store of Value is underpinned by a set of robust, interconnected principles that govern technology and business design decisions
- Adjacent players such as retailers and mobile network operators are using their digital platforms to expand their services and aggressively enter the world previously dominated by banks
- The financial services industry is on the precipice of complete transformation, driven by artificial intelligence and big data, and enabled by APIs. The first financial services leader to create a truly digital-at-the-core platform will have a massive impact on the market

Transformation of core applications on the path toward digitalization

Axel Rupp
Partner
Consulting
Deloitte

Dirk Guttzeit
Partner FSI
Consulting
Deloitte

Dr. Karsten Ballüder
Director
Consulting
Deloitte

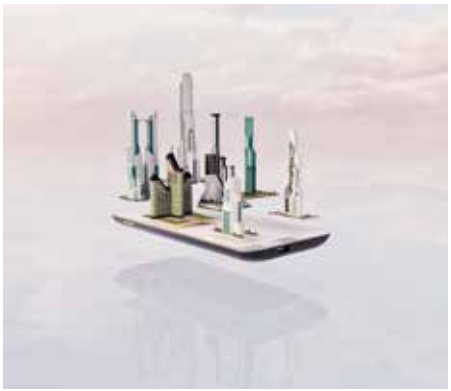
Björn Langmack
Managing Director
Consulting
Deloitte

Most financial institutions understand that digitalization is critical to meet the demands of tech-savvy customers. They also know that a fully digital business can enable them to create new products and services, and even broaden their business models.

At the heart of digitalization are customer relationships and their loyalty to the financial institution. And that's why digitalization can be fraught with risk. According to a recent Deloitte study on FinTech in the insurance sector, insurance companies often lack an adequate understanding of customer loyalty, provide inadequate value-added digital services, and may jeopardize one-to-one customer relationships.[1] Banks face a comparable scenario.

IT plays a crucial role in digitalization, albeit one that is hindered by a portfolio of applications whose technology stack dates back several decades. Even two-speed IT, which aims to integrate legacy applications with advanced technologies, doesn't go far enough. To be successful, a digital transformation strategy must encompass the entire application portfolio, organization, and processes in a multi speed model.

1 Deloitte LLP, "A catalyst for change: How fintech has sparked a revolution in insurance," 2018, https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-fsi-cataylst-for-change.pdf



In particular, companies should address digital sustainability among core back-end applications that have helped generate profits. Many do—Deloitte's Tech Trends 2018 shows that organizations across industries have made significant investments in mission-critical back-end systems over the decades.[2] Investment in back-end systems is particularly important for financial institutions.

The reason? Banks and insurance companies often use back-end technology that dates from the 1960s and 1970s. Many core applications have been written with legacy programing languages like COBOL or PL/1, and often access assembler subroutines that are even older.

Modern front-end systems typically use middleware technology developed in the 1990s. These core applications are usually run on mainframe infrastructures that are updated with new functionality in several large release cycles per year.

The modernization strategy

In the financial services industry, the CIO has the mission-critical task of implementing a fundamental IT transformation.

The financial industry is rife with initiatives for outsourcing IT infrastructure and application maintenance. The rapid improvement of encryption technologies and enhanced performance of APIs are persuading more firms to implement cloud solutions to varying degrees. Typically, they first move noncritical business processes to the cloud.

Transactional processes, such as those used in finance or compliance, are often outsourced without the CIO's control. This can externalize the associated applications and infrastructure components. While standard IT tasks are increasingly outsourced to third parties, legacy applications present distinct challenges. These applications are typically incompatible with modernized functionality, technology, and architecture.

Some of the issues driving modernization in the financial industry are as follows:

- Traditional ESB models are being replaced by highly flexible microservice structures. Modern front-end systems—mobile apps in particular—need these atomic services to achieve the required speed and dynamics.
- Organizations are designing more flexible core financial systems that enable products to be quickly adapted to market requirements. As a result, we're likely to see quantum leaps in time-to-market, ranging from agile forms of organization to fully automated DevOps.
- Customer centricity also brings the expectation that a great deal of information will be compiled and made available in near-real time. On the other hand, some processes are traditionally processed in batch mode.
- The development of analytics will help organizations better manage the business right down to individual customer engagement. The emerging

2 Deloitte LLP, "Tech Trends 2018: The symphonic enterprise," October 2017, https://www2.deloitte.com/insights/us/en/focus/tech-trends.html

field of artificial intelligence is likely to deliver additional customer-centric advantages.

In addition to these drivers, evolving workplace issues and regulation such as the following have made modernization of legacy applications a business priority:

- Modernization can enable organizations to either retire or reduce their loads on mainframes, which can result in sizable cost savings that can be reinvested in more differentiating technologies. The savings can be significant—research firm Gartner estimates that application modernization can reduce costs on hardware, software, and human resources by as much as 74 percent.[3]
- Developers and system programmers who maintain and continue to develop legacy applications are retiring and will continue to do so. This is a risk because these employees will take with them years of knowledge about the development of legacy applications, which is often undocumented.
- Increasingly stringent and pressing regulatory and security requirements can increase the operational risk of legacy applications. It is not unusual, in fact, for organizations to call back retired coders to help solve development issues.

As part of a comprehensive digitalization strategy, each CIO should prioritize these drivers, and define and implement an integrated modernization program for the entire application portfolio.

Paths toward modernization
Modernization is typically implemented using one of four methods:

New construction of applications (custom development): this approach to modernizing core applications has become increasingly rare in recent years. Custom development typically entails high risk, immense costs, and a very long development phase, all of which lessens its appeal. The advantage is a fundamental redesign of functionality, architecture, and technology. It is worth noting, however, that custom development can fail due to the lack of specialist resources and the long period between specifications and implementation.

The rapid improvement of encryption technologies and enhanced performance of APIs are persuading more firms to implement cloud solutions to varying degrees.

Use of standard software (COTS/MOTS): the successful use of standard software requires business processes to be easily mapped to the application. We very often see the use of standard software, despite large functional gaps. This can often require additional development that can nullify the advantages of standardization. Among global financial institutions, standard software solutions typically do not address all national and regional requirements.

Outsourcing: fewer organizations outsource their modernization initiatives. A primary risk is that old programming languages are transferred to the service provider and ultimately are not fully addressed. In addition, the relevant contracts must be drafted to help ensure that agility, innovation, and the requirements for functionality, architecture, and technology are effectively implemented. Often, however, outsourcing focuses on cost savings, and that can incur additional costs in the future.

3 Gartner, "IT Key Metrics Data 2017: Key Infrastructure Measures: Mainframe Analysis: Current Year," 2017IT Key Metrics Data 2017: Key Infrastructure Measures: Linux Server Analysis: Current Year, Gartner, 2017

Refactoring: this approach uses fully automated software to convert user interfaces, code, and data. Once converted, the refactored applications have the same functionality and behavior as the legacy applications. Significant advantages of automated refactoring include rapid implementation, a 10 to 15 month return on investment, enhanced scalability, and reduced implementation risk. Additionally, modernization and implementation of new requirements is typically faster and more reliable with the new platform.

In addition to these methods, some organizations opt for re-hosting (maintaining code, data, and user interfaces on a modern platform). Nevertheless, given the drive for digitalization, this scenario is not recommended because it tends to shift skills and functionality problems, rather than resolve them.

Combined, these factors will require that CIOs carefully assess the entire application portfolio to understand and prioritize existing modernization drivers. These drivers comprise functional, architectural, and technological criteria, as well as risk and cost considerations.

The modernization initiative should be aligned with the defined target state of the digitalization strategy.

A better way

Based on our experience, we have found that a method that Gartner calls Continuous Modernization tends to be the most efficient, fast, and accurate path.[4] It combines the rapid, low-risk automated refactoring and migration of the application to an open-system environment with the ability to continuously modernize applications to the desired functionality and target architecture.

The distinguishing characteristic of refactoring is its use of technology to automatically convert 100 percent of the application's components. This includes all online batch modules and interface modules, as well as the database. Refactoring tools can also fully automate test-case creation and execution, providing a further advantage.

The strength of refactoring lies in its 1:1 functional mapping of the code to the new technology. For example, automated refactoring can precisely map data types, as well as the arithmetic comparison operations, to help ensure that the resulting application behaves identically to its legacy predecessor. What's more, developers can easily compare legacy code with the transformed target application, with the potential to greatly minimize implementation risks.

The transformation

Once the code has been refactored and migrated to an open platform, the modernization phase can begin.

Following the Continuous Modernization approach, tasks are prioritized to create an efficient path toward modernization. This matters because approximately 30 percent of the legacy codebase is typically never changed. Freezing unchanging code in the target system can allow the modernization initiative to concentrate on the remaining 70 percent of the code base.

All modernization activities should be consistently aligned with the future-state target. Automatic or semi-automatic code-mining activities can be executed on the new platform to support and accelerate integration with the target architecture.

4 Gartner: Use Continuous Modernization to Build Digital Platforms from Legacy Applications, January 18, 2018, ID: G00344837

They can also help identify and resolve friction points, as well as help prioritize microservices for mobile applications. This platform can also be used to modernize business rule externalization, workflow management, data analytics, and cloud transformation.

The advantages of Continuous Modernization can be further enhanced by the adoption of a DevOps model. DevOps can help support agile development, continuous integration, continuous delivery, and continuous monitoring. But it's important to note that it must be backed by state-of-the-art toolchains. Modernization provides CIOs with an opportunity to introduce an agile culture that, in addition to agile front-end development, helps achieve a state of right-speed IT.[5] Legacy system developers can be integrated into DevOps teams to share knowledge of and experience with the application.

From the frontline:
Neither make nor buy: refactor and modernize

Business situation: an international insurance company operated its core business applications on an aging mainframe. The system had been customized over many years to meet the insurer's specific business needs. It was stable and very reliable. However, the company was having difficulty finding qualified COBOL developers, who are retiring in waves. Another significant issue was operating costs that were increasing year over year.

A stalled attempt: the insurer, working with an external vendor, had launched a project to rewrite the core application. The project duration was estimated at three years, but seven years after starting, only 30 percent of the functionality had been rewritten in Java.

Solution and impact: the insurance company engaged Deloitte to help it design and implement a code-conversion initiative that could be rapidly implemented. Our fully automated Refactoring tool enabled a smooth go-live on a Linux platform after only two years. The company then decommissioned its mainframe and began to incrementally modernize the application for future needs.

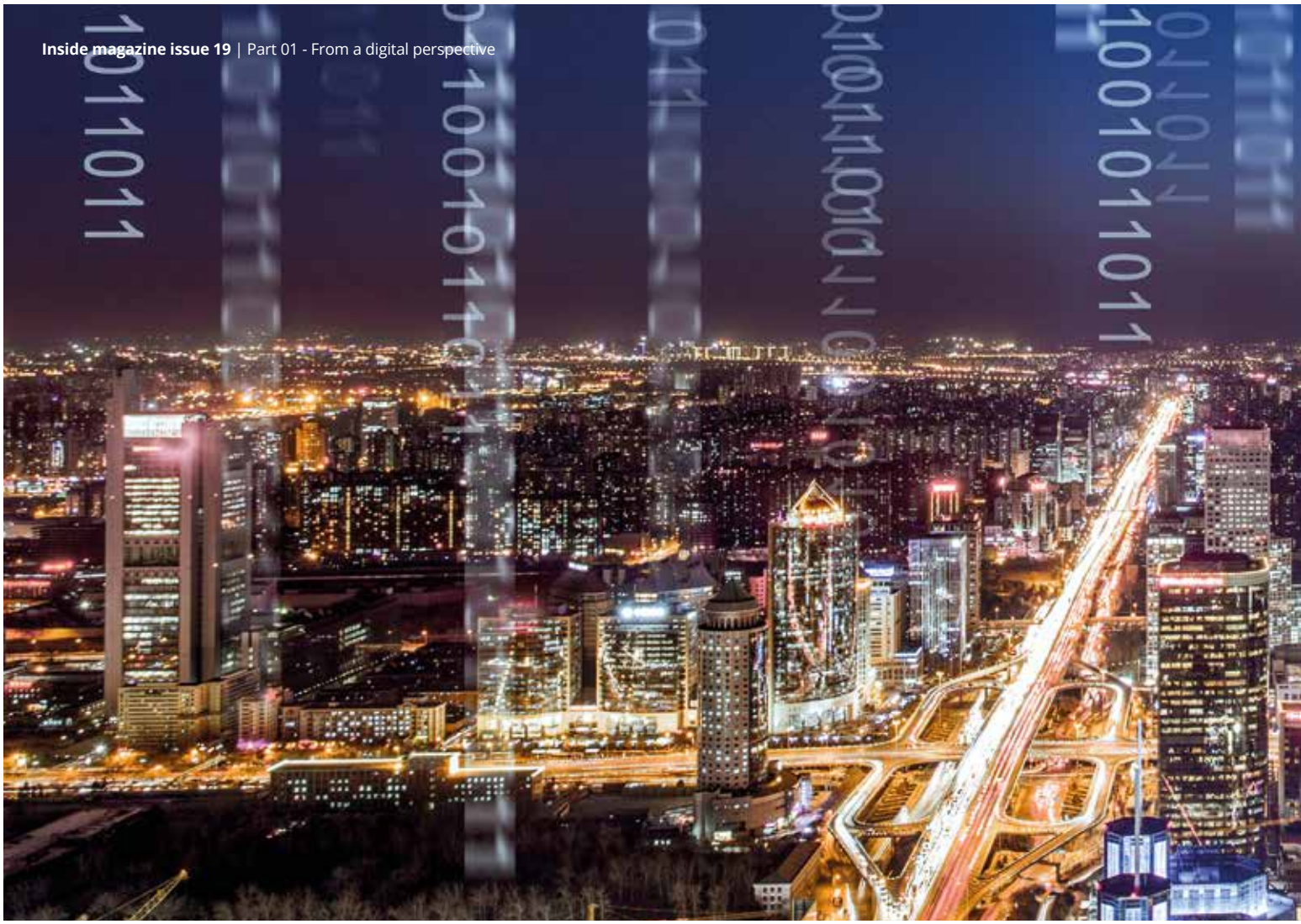
Conclusion

Financial institutions cannot afford to base their digitalization strategy solely on front-end systems. Rather, they should carefully craft a digitalization strategy that also emphasizes back-end applications and is fully integrated in the modernization strategy.

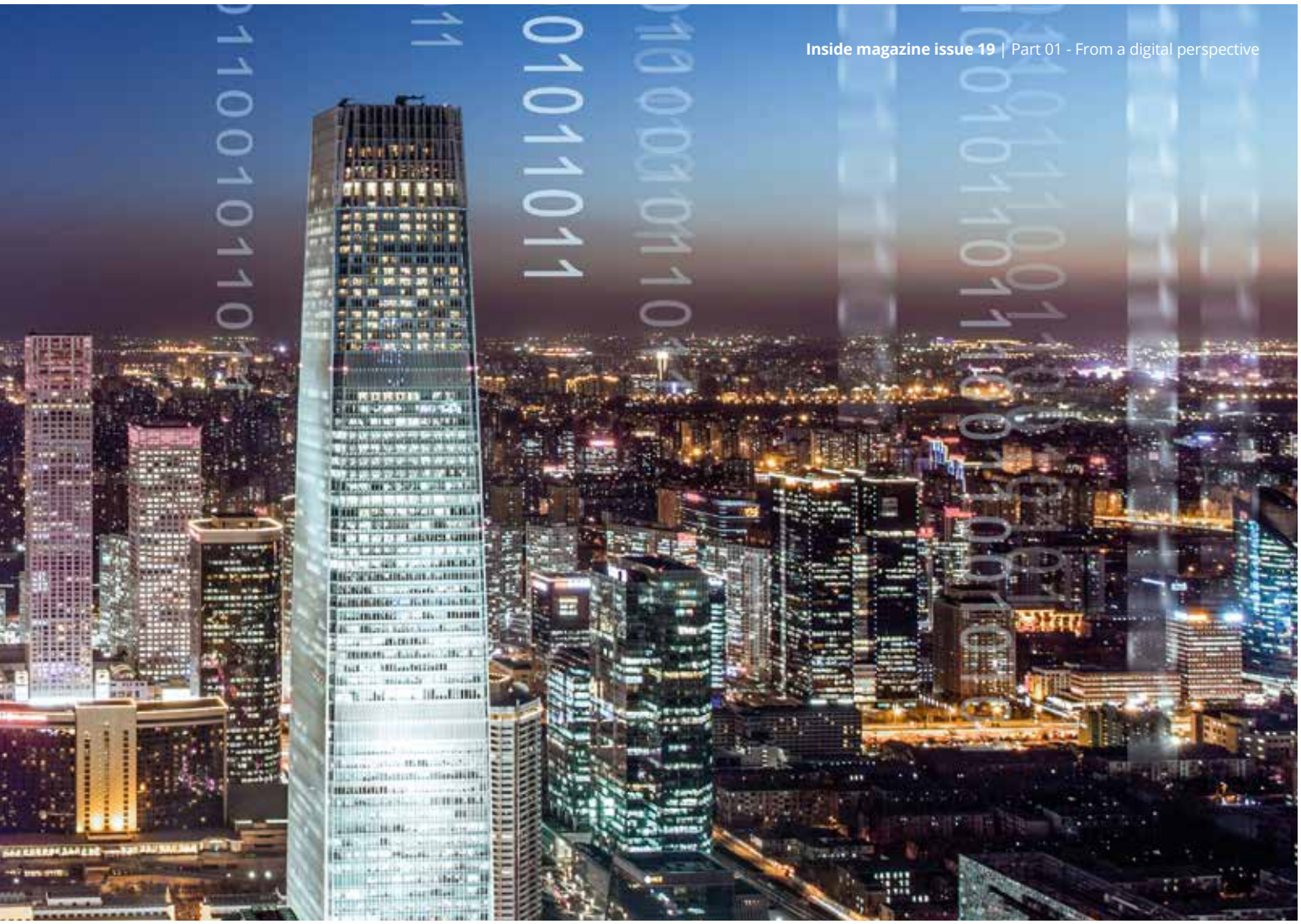
To get there, each organization will need to carefully assess its current- and future-state systems, and identify and implement a singular modernization strategy. There are no shortcuts, and there is no universal approach. Issues such as a lack of talent, the speed of implementation, and transformation risks will affect each business in unique ways.

A combination of refactoring and subsequent modernization phases can help organizations reap the advantages of a transformational project while eliminating corresponding disadvantages. Ultimately, this approach can also help CIOs prioritize the right investments to transform legacy applications into a sustainable platform. It can also help implement the requirements for functionality, architecture, and technology in an agile organization.

5 Deloitte LLP, "Right-speed IT: Living between black and white," 24 February 2016 https://www2.deloitte.com/insights/us/en/focus/tech-trends/2016/devops-it-optimization-speed.html



Open Banking
What worked in the past is not good enough for the future



Meirav Hickry
Partner
Consulting—
Technology
Deloitte

Ronan Vander Elst
Partner
Deloitte Digital

Steve Hauman
Partner
Technology & Enterprise
Application
Deloitte

Sébastien Genco
Director
Technology & Enterprise
Application
Deloitte

Between 2018 and 2019, the financial services industry will undergo a transformation that is bound to change the relationship between consumers and their banks. The EU's Revised Payment Services Directive (PSD2) is one of the main elements that will trigger this transformation. Actually, PSD2 aims at giving back to consumers the control over their financial data by requiring banks to develop Application Programming Interfaces (APIs).

Open Banking represents a strong shift in from the way banks used to operate. It is driven by various factors, ranging from regulatory imperative, innovation, and new consumer expectations.

From an innovation point of view, new technologies and trends are hitting the banking industry and bringing new features to enhance customer experience, improve processes, and accelerate time to market. In addition, FinTechs have multiplied in the last decade, surfing on innovation to create new service offerings that sometimes compete with (or complete) bank offerings.

In this context, pressure from consumers is growing, as their expectations of what banking services should provide have increased. Customers not only take new features for granted, such as being able to check their bank accounts and transfer money from all their devices, but they also expect all of it to be a seamless, instantaneous, costless, and secure process.

In parallel, the evolution of banks' architectural landscape has produced a highly complex and fragmented landscape of systems. This translates into siloed systems and a back-end infrastructure that struggles to meet demand, both of which are challenging to maintain. This was acceptable when banks' transactional and customer data was not required to be shared with third parties. The situation has changed, however, and banks are now faced with a challenge.

Achieving Open Banking starts with answering several architectural questions related to security (how to secure data access/transfer from/to the outside world), flexibility (how to compensate inertia of legacy core systems), agility (how to keep pace with small-scale competitors), and scalability (how to face the demand increase in a cost-efficient way).

Open Banking refers to a new business model where banking data is shared between two or more parties to deliver enhanced products and services, including those that are non-financial. It is based on the use of APIs—technical interfaces through which interactions happen between a company and one or more external parties.

Banks need to act swiftly and transform these threats into opportunities by leveraging current trends in their transition from a monolithic business model to a distributed data access and sharing business model.
To overcome these challenges, banks will have to combine innovative front-ends with legacy back-ends. To illustrate how banks' architecture should evolve, Deloitte has designed the Next Generation Platform (NGP) to enable the integration of third parties in a secure and flexible way and by ensuring a fast go-to-market to focus on clients' experience and product design.

NGP is based on four key guiding principles that are the stepping stones for an Open Banking-ready architecture:

01. The distribution layer should be independent and self-sustained. Channels should remain accessible and up-to-date even when back-ends are offline. This is particularly important, as banks will not have control over external products distributed through their channels.

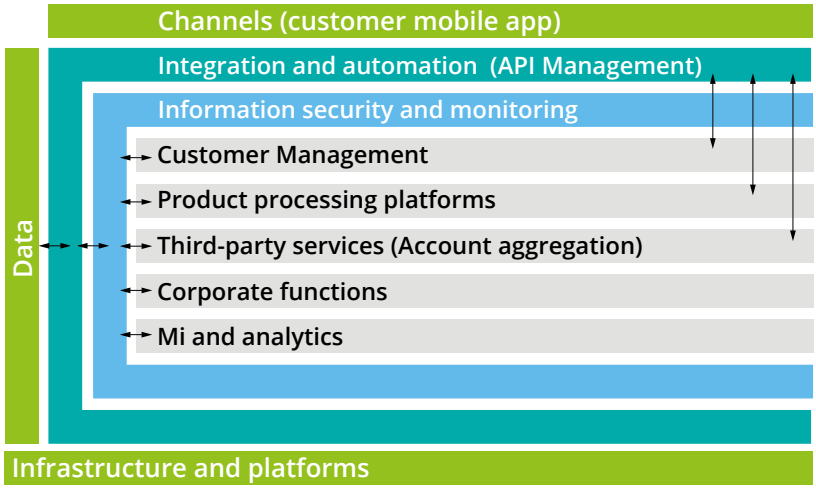
02. Information related to prospect/ customer should be located close to the distribution layer to allow it to be better controlled and used. It is still possible to replicate data for specific processes when required, as long as it is done using the "need to know/need to use" principle.

03. Back-end systems should be used as product factories only. The multiplication of back-ends and services provided by third parties can quickly create siloes. Limiting the scope of back-ends to what they are good at makes it possible to better segregate duties. In addition, access to back-ends should be done via the exposition of services.

04. Orchestration and integration should be managed by an integration layer, which is the central component of the architecture standardizing, securing, and exposing services offered by back-ends and third parties.

Until the recent past, banks mainly distributed their own products through their own channels. The new normal will be to distribute their own and external products through their own and external channels.

Figure 1: Typical Open Banking architecture based on those four principles



To illustrate the potential benefits of an Open Banking architecture, we have implemented two Minimum Viable Products developing different customer journeys.

Next Generation Platform is Deloitte's initiative to imagine how Open Banking could be achieved and what opportunities it would bring to banks. It is composed of a reference architecture instantiated through concrete customer journeys.

First Customer Journey: Account aggregation to acquire new clients

The first implementation of the Next Generation Platform is done in a retail banking context. It starts with a common life event, which leads to an opportunity for the bank to acquire a new client.

Let us introduce Thibault and his girlfriend Marie who are at a restaurant for Valentine's Day. When it comes time to pay the bill, the card Thibault wanted to pay with is rejected because of insufficient funds in the linked account. This is a classic situation for people who have multiple accounts at different banks. Marie uses an aggregation app to monitor all her bank accounts at once and tells Thibault about it. Interested, he downloads the app, creates a profile, and links his bank accounts. On his way to work, he sees a discounted offer for a trip to Cuba. He decides to create a goal for financing it, thanks to the personal finance management features of the app.

So far, Thibault is not a Next Gen Bank client, however the bank has been able to catch and monitor a lead linked to Thibault's activity though the app. The bank has collected information on Thibault's financial situation and can prepare a customized loan offering for his plans to travel to Cuba. This is a concrete opportunity to convert Thibault into a client.

In this example, the bank has been able to seize the opportunity thanks to three main characteristics of its architecture:

- The implementation of an account aggregation and personal finance management feature not developed internally but offered by offered by a third party.
- The collection of information regarding Thibault's financial situation. The centralization of this customer/prospect's data allows the bank to have a complete and up-to-date view of his situation.
- The fast creation of a custom loan offering based on information collected (i.e. the goal to go to Cuba) through servicing of the back-end layer enables the rapid creation and sending of a custom offering.

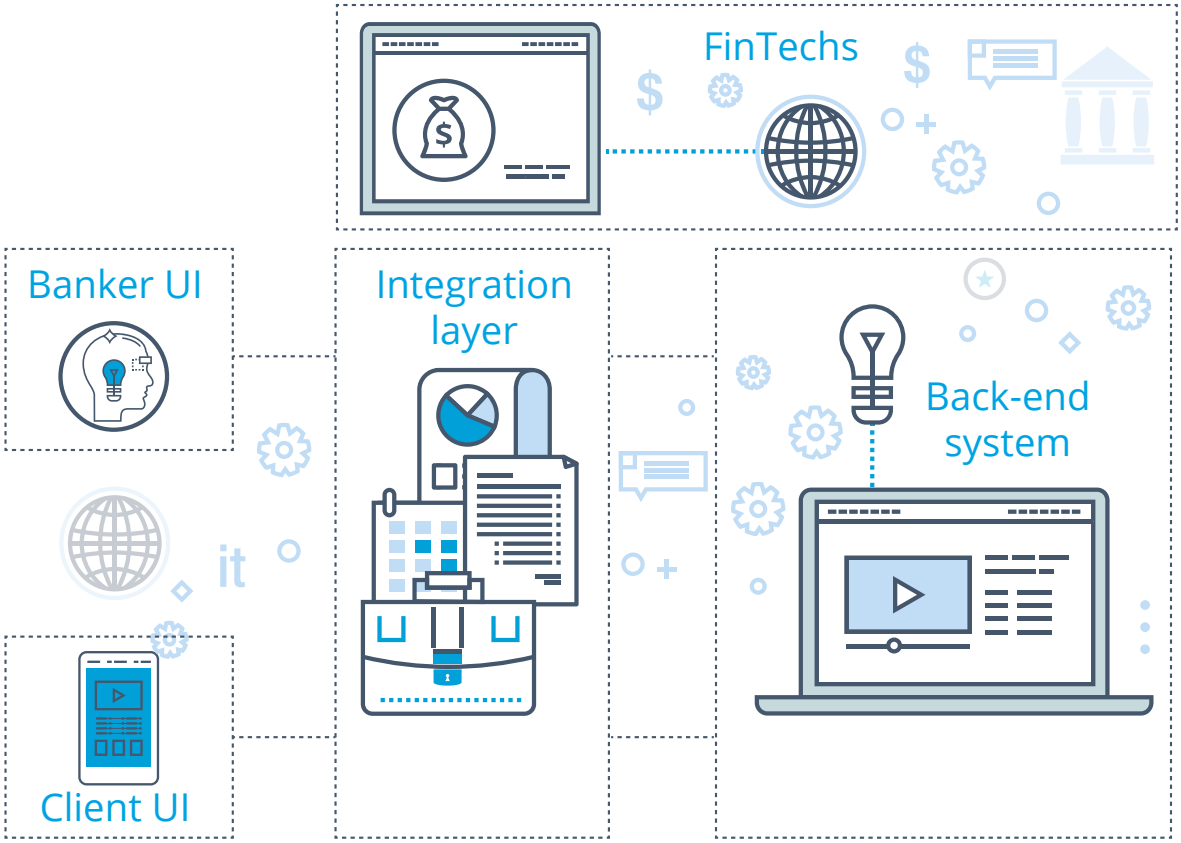
Second Customer Journey: automatic risk analysis and portfolio comparison used to propose alternative investment

The second implementation of the Next Generation Platform is designed in a wealth management context. It gives another illustration of how the integration of FinTechs can generate opportunities.

Let us introduce Michel, a 58-year-old Luxembourgish notary with a high annual income. He has already defined his investment objectives and has adapted his portfolio accordingly. While at a VIP car event, Michel sees his dream car in action and is interested to see what impact buying it would have on his investment objectives. Curious, he decides to follow his friend's advice and creates a profile on the Next Gen Bank website. After linking his investment portfolios, he quickly obtains a first analysis of them in the form of a dashboard with his investments scored against market standards and Next Gen Bank products. Michel then sets his investment objective to see the impact of buying his dream car on his current situation.

As in the case of the first customer journey, Michel is not yet a client of Next Gen Bank, but he has been able to quickly get an evaluation of his portfolios' performance. From the bank's perspective, information collected about Michel will help build a tailored approach to contact him.

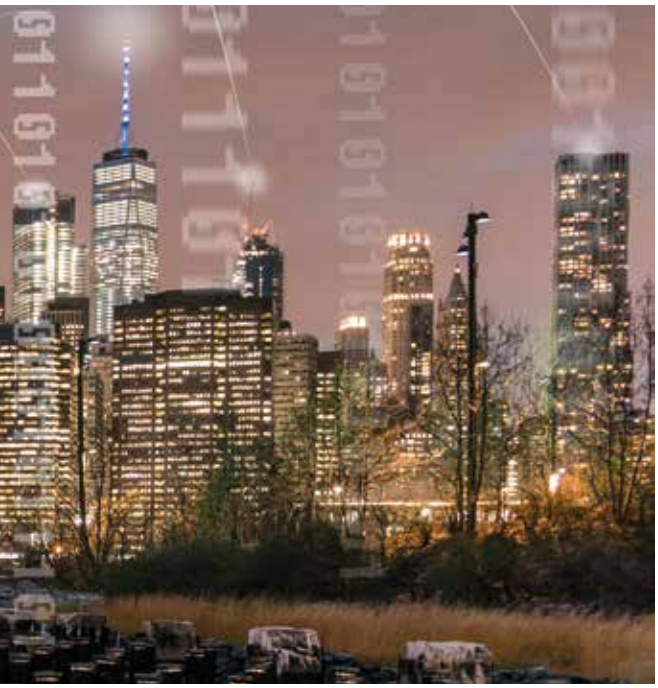
Figure 2: How does the Next Generation Platform work?



From an architecture point of view, the Next Generation Platform has been designed as a micro-serviced architecture.

- An API Management solution (namely Mulesoft) is implemented to build an integration layer acting as the central component through which all data and service requests must go. This makes it possible to standardize security management and data exchange.
- The integration layer is also aware of micro-services that back-end systems and FinTechs can provide. It is therefore the perfect place for macro processes involving different systems to be designed. Of course, the flexibility of the micro-serviced architecture depends on the capability of back-end systems and FinTechs to expose granular functionalities, but this is increasingly frequent with recent technologies.
- The implementation of a customer relationship management system (namely Salesforce) acts as the main interface for bank users (at front side). It allows the management of the lead/opportunity process with a complete view of information available on the prospect/client. Indeed, This CRM is the central component where client data is stored, which also makes it easier for client data quality management.
- Regarding the client-dedicated user interface, it takes the form of a mobile application, which communicates exclusively with the integration layer. The use of an integration layer also brings decoupling capabilities, meaning that the user interface is still usable even if back-end systems are offline.

Regarding infrastructure aspects, the Next Generation Platform has been designed to adapt to banks' constraints. It can be entirely operated on a cloud-based infrastructure or leverage on-premise capabilities. The main challenge has been to enable efficient and secure communication between various and different forms of deployment support (i.e. cloud vs on-premise). The use of an integration layer to centralize communication is critical to making it work. The core architecture uses the Salesforce platform for building the customer-centric view and tracking leads/opportunities; Temenos solutions as the main back-end system exposing services related to loan and investment definition; and Mulesoft for building the integration layer. Several FinTechs are also involved; Budget Insights provides account aggregation and personal finance management features; Neuroprofiler provides features for profile definition (risk, and more); and Aixigo provides features for portfolio analysis and comparison. The platform is not limited to these technologies and could integrate others with limited effort.



The core architecture uses the Salesforce platform for building the customer-centric view and tracking leads/opportunities; Temenos solutions as the main back-end system exposing services related to loan and investment definition; and Mulesoft for building the integration layer. Several FinTechs are also involved; Budget Insights provides account aggregation and personal finance management features; Neuroprofiler provides features for profile definition (risk, and more); and Aixigo provides features for portfolio analysis and comparison. The platform is not limited to these technologies and could integrate others with limited effort.

Conclusion

What worked in the past is not good enough for the future. Regulation, innovation, and new consumer expectations will accelerate the appearance of new actors, which will tend to compete with banks. In this context, there is momentum for banks to rethink their business models.

Open banking should be seen as an opportunity for banks to build a future-ready architecture that will allow them to expand their services by focusing on clients' needs. Indeed, the whole financial journey of buying a new property, new insurance cover, financing a new car, accessing wealth management, or even provisions for pensions present significant risks for customers who are looking for knowledgeable and trusted partners. And banks still fill this need!

The next generation data platform

Martin Lidl
Director
Consulting
Deloitte

Tom Robinson
Senior Manager
Consulting
Deloitte

James Moorhouse
Manager
Consulting
Deloitte

Organizations are under pressure to deliver value through data-insight-driven solutions in a financial market that is fast-paced and in businesses that can be complex and constrained by financial regulations.

Over the last decade, there has been a trend in financial organizations to remove siloed data sets and introduce people and processes to tune their data assets into a state whereby they can deliver traditional use cases and make insightful decisions at pace worldwide.

Traditional business intelligence and analytical use cases are maturing and new advanced analytical use cases are emerging that were previously unachievable. For example, insurance businesses are now processing large volumes of sensor data to analyze driver behavior and provide tailored premiums. The analytical processing required for this is typically unachievable in a traditional data platform. Organizations are choosing to create siloed solutions for each use case rather than thinking strategically and building a platform that caters for multiple needs. Organizations now require a fusion of cutting-edge technology ecosystems and flexible delivery models to satisfy all use case types. Organizations now require a **next generation data platform**.

"The next generation data platform is a fusion of disruptive and state-of-the-art technology with flexible delivery methods and tight and effective business partnering."

Martin Lidl
Financial Services Director within Analytics & Information Management Consulting, UK

A data platform is a centralized system that combines scalable flexibility with distributed data storage and computational power for acquiring and analyzing large data sets to provide users with reliable and accurate data. On the surface, many data platforms are achieving expected outcomes for traditional reporting but are struggling to keep up with the demands of the business for new data sources, larger volumes of data, and support for advanced analytics and machine learning. Sound familiar? If you strip everything back, is there anything different from the same structured solution that has been applicable before, but on a much larger scale? This, when coupled with the advent of big data and cloud technologies that are just starting to achieve wider adoption, means that organizations now have the opportunity to transform their legacy "fixed capacity, fixed use case" data platforms into genuinely flexible and scalable solutions.

To build a next generation data platform, we must first determine the underlying needs of an organization, the fundamental capabilities that the platform must offer, and the use cases that it should be used to deliver. We can then assess their existing IT landscape to augment existing components that work and replace legacy tools that are not fit for purpose to deliver incremental value.

Organizations should never replace a solution with a like-for-like alternative before making this assessment, or they risk associating an overestimated cost benefit with a solution that delivers the same previous value.

Figure 2: Old World versus New World

Fixed capacity	Infinite scalability
Structured data only	Support for all data types
Traditional use cases only	Traditional and advanced analytical use cases
Long lead times on data acquisition	Rapid new data source onboarding
Frustrated data scientists	Enabled and empowered data scientists
Large point-in-time investments	Pay-as-you-go infrastructure
Data understood by power users only	Democratization of data through data catalogues

"Organizations have been excited about big data technologies and the possibilities they can offer, but at the same time not strategic enough when implementing them. Technology should not be implemented for the sake of it. This requires strategic thinking about how your technology estate enables the business to deliver its vision."

Martin Lidl
Financial Services Director within Analytics & Information Management Consulting, UK

There are six key themes to be considered when implementing a next generation data platform. They are: **governance; use cases; infrastructure; privacy and security; tooling; and delivery approach**. These principles provide organizations with an approach to implement a top-down, all-inclusive strategy that can deliver tangible business value at pace across an organization.

A next generation data platform tackles these principles with key functionalities. The following outlines five stand-out technology features that address these:

Figure 3: Next generation data platform capabilities

Intuitive data management

An influx in data has meant financial institutions have had to implement data governance frameworks quickly or risk their data becoming unusable. Recent legislation, such as GDPR, has seen even more focus in this area, but rather than taking a holistic view of this problem, a "fast and dirty" approach has been applied to meet EU-imposed deadlines. This has left organizations in a position whereby they are compliant from a regulatory standpoint, but their data management capabilities are limiting.

Master data management and metadata management are often an afterthought when managing data, but if applied correctly they can act as valuable tools. They work in harmony to solve data management problems through:

- **Trust—**Recording information on data quality, lineage, accountability of data stewards, and coverage
- **Collaboration—**Intuitive user interfaces support communication and task sharing, rewarding user contributions
- **Discovery—**Providing a comprehensive view of data assets with summary statistics
- **Governance—**Supporting cross-functional workflows, complying with legal requirements, and providing appropriate access rights

Data exploration

Since the introduction of big data technologies, the approach toward data ingestion has been "more is better," with financial institutions on a mission to persist data in a single location and transform from a product-focused business to a customer-focused business through customer segmentation. Although this method has been successful in breaking down silos, it has led to data platforms containing sets of varied data types, thus making a data consumer's task of finding useful insights like trying to find a needle in a haystack.

To understand data and formulate value-driven use cases such as personalized marketing by analyzing customer spending behaviors, the following core concepts should be considered:

- **Analytical sandboxes—**User-controlled areas that are segregated from gold-standard production data. They provide a means to copy data into a secure experimental environment without having to rely on data engineers to curate data. Users can blend datasets and create working pilots that, once completed, can be passed back to engineers to productionize and share with a wider audience.
- **Data science tools—**There has been a sharp incline in advanced analytical use cases, particularly within fraud detection. The varying data formats and use cases mean there is no longer a single "one-size-fits-all" solution. To ensure data scientists are not impeded, they require an extensive range of tools that can be used together to detect unusual customer spending habits using predictive analytics.
- **Self-service dashboards—**A next generation platform should reduce the dependency on IT by offering self-service dashboards to business users and empower them to build their own analytical reports. Embedding analytical capabilities into the business requires multiple layers of collaboration, consensus, education, and change management—something that can be achieved using Deloitte's "Insight-Driven Organization" framework[1].

1. https://www2.deloitte.com/uk/en/pages/consulting/solutions/insight-driven-organisation.html

"Utilizing your Data Platform for Advanced Analytics, you will very rarely find the need for multi-year projects. Delivering value incrementally through targeted, self funding use cases is incredibly powerful and a very natural way to bring about change."

Martin Lidl
Financial Services Director within Analytics & Information Management Consulting, UK

- **Pre-built/trained machine learning models—**Good machine learning models can take weeks to configure, with model training limited to the volume of classified data that can be processed. A next generation platform promotes the sharing of proprietary models created in-house with the wider organization to reduce rework. Out of the box (OOTB) machine learning models follow the same path as OOTB data models that were introduced to financial services years ago.
- **Automated infrastructure—**As customer transactional data grows, technology dictates that platforms can be scaled to accommodate this. However, once a data platform reaches a certain size, even the simplest of tasks require a considerable amount of effort and time, eventually becoming unsustainable. In order for next generation platforms to be truly future-proof, the following processes should be automated:
  - **Cloud deployment—**Financial services have tried to modernize their infrastructures by adopting cloud tools, but these can still take time to install and align to organization security policies and infrastructure. The introduction of cloud technologies allows next generation platforms to be implemented and configured before saving the set-up to an image, which can be reused at a later date. This provides IT with the control to automate the deployment of a data platform with varying size and power at will.
  - **Auto-scaling—**Scaling a data platform can be difficult depending on size and complexity. Traditional scaling involves monitoring the capacity of a cluster at set intervals and manually spinning a node up/down to adjust to changing user requirements. The problem with this approach is that users are unpredictable. If five data scientists were to train their machine learning models at the same time, a data platform would need to be dynamic enough to scale quickly and ensure performance remains consistent. A next generation platform should monitor performance autonomously and automatically adjust capacity to meet changing user needs to maintain expected performance.
  - **Cloud optimization—**As next generation platforms implement auto-scaling features, you would be right to think that costs could soar due to poor performing queries over-utilizing resources and the platform reactively scaling up. To prevent this, cloud technologies coupled with a defined set of policies can work in tandem to ensure instance types, availability zones, and resources are optimized to manage a data platform at the lowest possible cost.

All-inclusive security

As data platforms grow ever more complex, the number of potential vulnerabilities increases exponentially. Changes in responsibilities and complex permissions can provide opportunities for unauthorized data access or even loss. If data owned by a bank were to be compromised, large fines would be imposed by regulators and their brand image would be destroyed.

Security should be at the forefront of any financial institution's platform, underpinned by a security philosophy that provides guardrails—a security or governance framework that removes the opportunity for an organization to get it wrong or be compromised—to secure business assets without restricting innovation or pace.

Metadata-driven ingestion

There are traditionally five key methods that are largely adopted within finance to ingest data. Change data capture, streaming, direct database access, manual file transfer, and event-based messaging are all proven methods to acquire data, but they can be slow when trying to ingest a source. The process of building ingestion pipelines is difficult when IT landscapes are evolving, heterogeneous data source schemas are changing, and the quality of data is varied. Traditional data ingestion

"Next generation data platforms are an evolution of organizations' existing technology estate and delivering them without building up a mountain of technical debt requires strategic vision, a sound methodology, and flexible delivery methods."

Martin Lidl
Financial Services Director within Analytics & Information Management Consulting, UK

frameworks are now dated and metadata-driven ingestion is becoming more popular. Metadata-driven ingestion is an approach to building ingestion pipelines by using a configurable set of attributes to define the common characteristics of data that determine extraction, transformation, and loading behavior across pipelines. This allows businesses to minimize dependency on data source technologies, reduce development and effort repetition, and therefore increase the speed of ingestion for new data sources.

Delivery approach

Solution implementations within financial services have been historically sluggish and detached from the business. A next generation platform requires a delivery approach that promotes agile ways of working with a DevOps paradigm from data ingestion to industrialization.

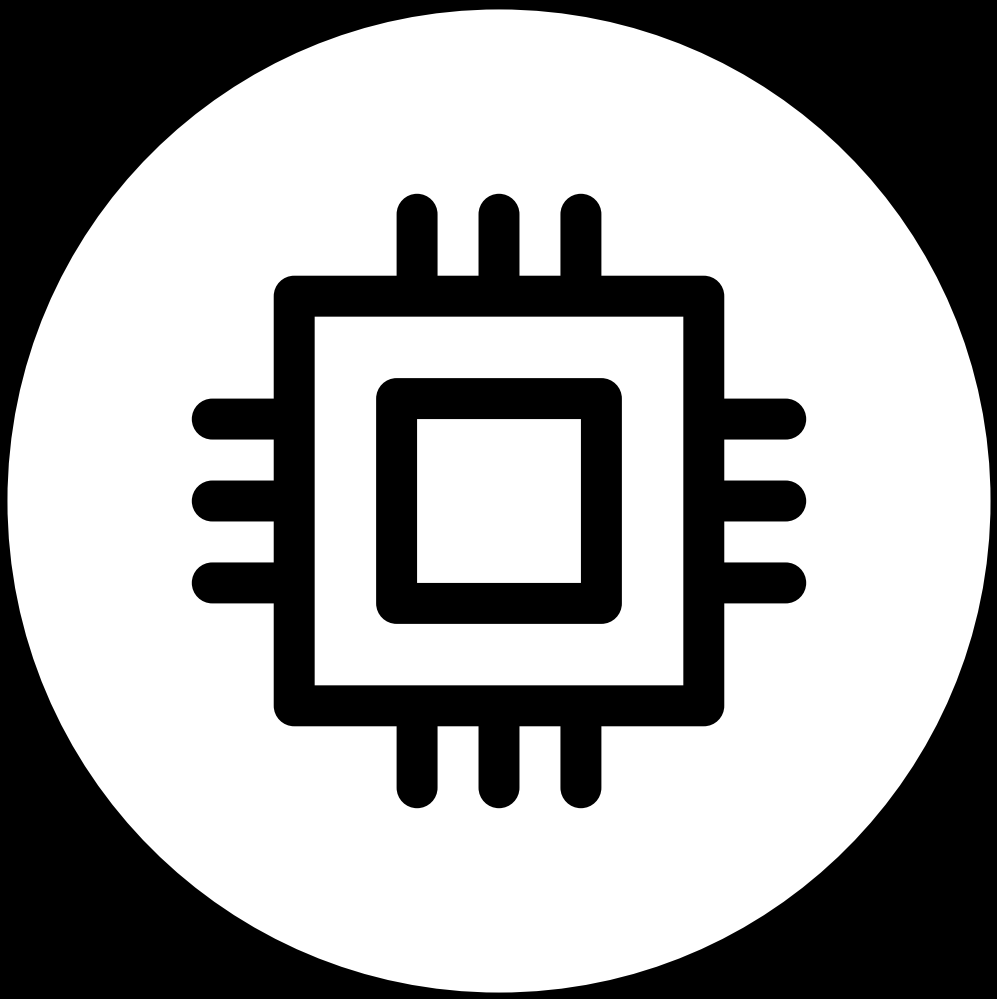
A next generation delivery approach provides an accelerated framework for implementation. This four-step approach can be used in different agile flavors for organizing tasks, releasing cadence, scheduling, and carrying out an iterative implementation:

- **Ingestion—**Managing and prioritizing data sources for acquisition, ingestion, and provisioning of data will help identify golden sources of data, gaps in capabilities, and a controlled method of metadata ingestion for structured, unstructured, and streaming data.
- **Data controls—**Performing data analysis using tools available for discovery will help profile data and identify early data quality concerns. Combining this with associate data and linking to a business glossary can help pinpoint relationships between data sources and track data lineage. Finally, the classification of data will facilitate the early conception of data privacy and masking rules.
- **Industrialization—**To roll out repeatable, self-learning methods to operationalize proven methods or concepts, non-functional requirements relating to prioritized use cases must be collected, logical and physical data models for consumption layers must be designed, and development, testing and deployment into production must take place in an agile manner.
- **Analytical modeling—**Analytical modeling must define and validate a hypothesis to generate actionable insights aligned to organizations' strategic goals. To do this, business objectives must be collected to generate a hypothesis based on prioritized business benefit. Data is then prepared in parallel, analytical models are optimized and run to prove/disprove the defined theory.

Conclusion

In an environment of exponential growth in data volumes, data complexity, and business demand for deriving value from data, the challenges of combining and exploiting data can only be met with a strategy focused on delivering incremental value toward an end-state that provides a future-proof, holistic data capability for an organization. This requires a platform approach that implements an integrated next generation solution across the full breadth of data capabilities.

A next generation data platform is intended for innovative environments that are flexible enough to accommodate a fast-moving technology landscape with a proliferation of open source solutions to satisfy emerging use cases.



Part 02

From a core transformation/ technology perspective

IT cost allocation

The gateway to business alignment and mature service management... if done correctly

Patrick Laurent
Partner
Technology & Enterprise Application
Deloitte

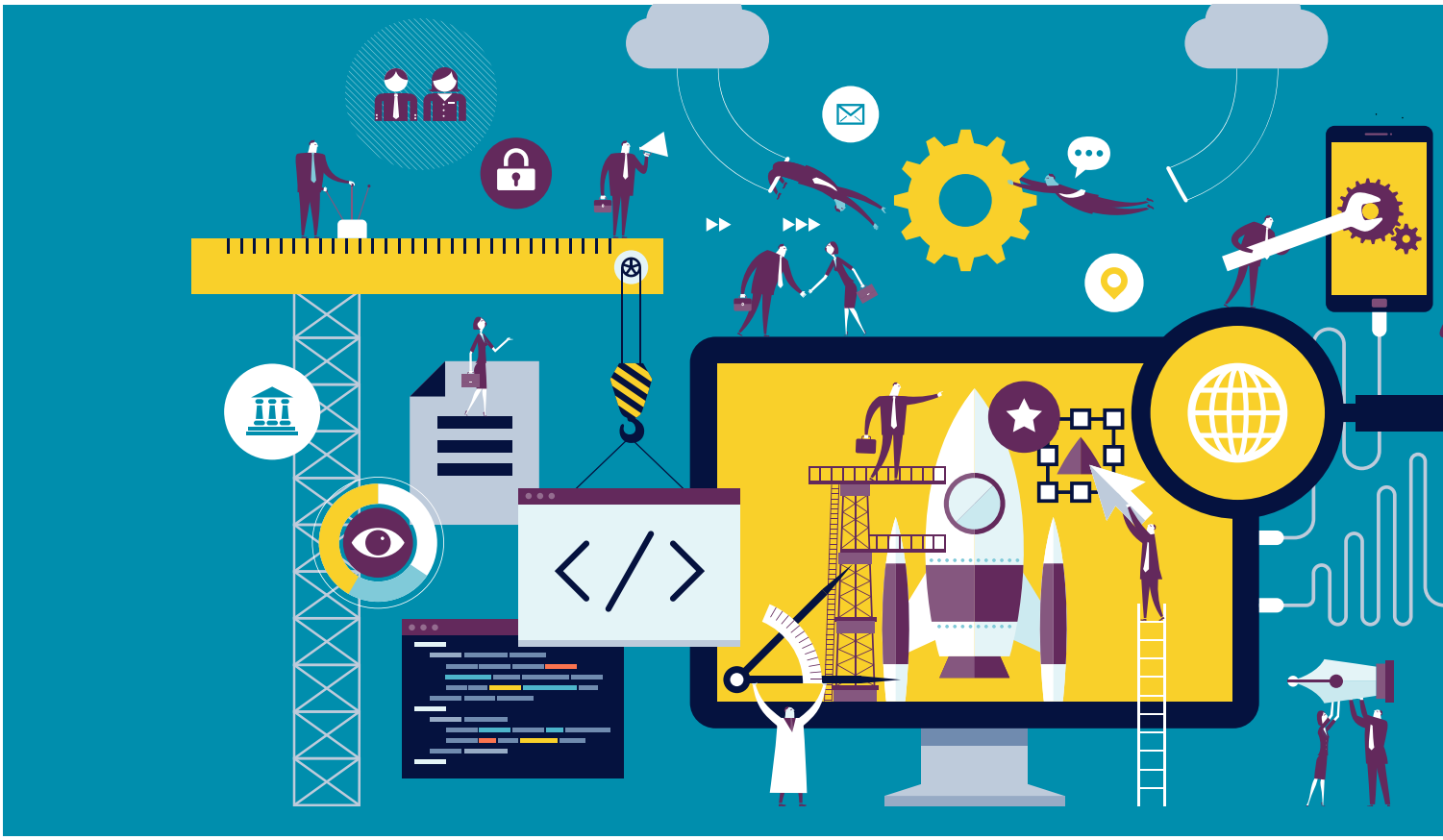
Jesper Nielsen
Director
Technology & Enterprise Application
Deloitte

Regis Jeandin
Senior Manager
Technology & Enterprise Application
Deloitte

IT departments are constantly asked to deliver more with less and ensure a higher level of service orientation. This pressure is often due to a low level of understanding of what IT departments are actually delivering as well as how those services are delivered. This is partly IT's own fault, as IT departments often are poor at explaining what they deliver, and little standardization and official service-provider-attitude holds IT back.

In the current business environment, where outsourcing is increasingly used, where cloud solutions are increasingly adopted, and where IT is being asked to justify their budgets, there is a solution and possible way to turn the tide. Using the TBM (Technology Business Management) methodology combined with a service catalogue, IT will be able to effectively communicate what is delivered and how the cost structure behind the services is made.

There are certainly alternatives to TBM. Tools like spreadsheets are great when the amount of data to analyze is low, but maintenance and usage require a lot of manual effort and errors are hard to discover. ERP and CPM systems are great for pure financial analysis but often lack the understanding of IT organization, structure, and components.



Technology Business Management taxonomy and model description

TBM starts with the implementation of a framework, which enables transparency of costs, tracking of the resource consumption, and evaluation of the performance. The framework will settle the foundation of the alignment between IT, finance, and business unit leaders by implementing a shared taxonomy.

The TBM taxonomy describes the cost sources, technologies, IT resources (hereafter called IT towers), applications, and services. It allows the mapping and allocation of:

- Cost and resource consumption (hardware, software, labor, services, and facilities) to
- Applications and services (being developed, delivered and supported) to
- IT business units (beneficiaries of services)

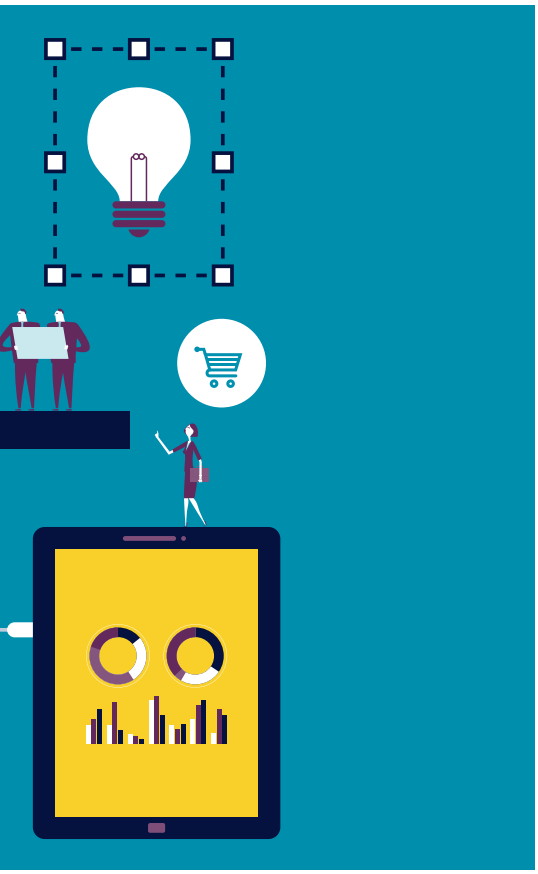
Finance: defining the cost pools and sub pools

Financial information is very well structured within the general ledger of organizations. As organizations are obliged to record transactions relating to their assets, liabilities, owners' equity, revenue, and expenses, the information embedded in the general ledger, within the accounting software or ERPs, is not only providing auditable information, but also valuable details and structure.

The TBM taxonomy will highlight eight standard cost pools and one customizable pool. These pools are easily understandable and are provided by the general ledger. The split between Capex and OpEx is already available within the accounting tables.

- **Internal Labor** relating to employee wages, benefit expenses, and occupancy
- **External Labor** for the contractor fees and their travel expenses
- **Outside Services,** which can be activities handled by external consulting services, managed services providers, or cloud providers for infrastructure as a service, platform as a service or software as a service solutions
- **Hardware** on lease or on capital purchased, its maintenance and support, its spare parts, consumables, its depreciation and amortization
- **Software** purchase or lease and its depreciation, software licenses, development, maintenance and support
- **Facilities and Power** relating to datacenters or offices (lease or build or purchase), physical security, maintenance, and support
- **Telecom** voice (office and mobile) and data (network connectivity, usage)
- **Internal Services** related to the shared services sub pool

One additional pool, labelled "Other," has been created as well allowing any company to map miscellaneous or non-standard expenses.



IT towers allocation

Once the data has been structured across the cost pools, the IT tower allocation can start. Each and every service or application can be mapped with a defined set of these eleven towers and forty-one sub-towers.

- **Data center** covers both the enterprise data centers (e.g., facilities hosting the critical IT components with the relating space, power, racks, cabling and services), and all other facilities like the computer rooms, the distribution/telco rooms, the call centers, and the business offices
- The **compute** tower covers the hardware, software, labor, and support services relating to different kinds of servers: Generic Servers (Microsoft's Windows servers, Linux servers), Unix servers, midrange servers (IBM AS/400), converged infrastructure (purpose built appliances, appliances...), hyper performance computing, and mainframes
- **Storage** encompasses the technologies, software, and labor required to perform online and offline storage as well as mainframe online and offline storage. Details on the sub-tower will make the distinction of on premise storage, cloud storage, archiving solutions, data corruption, disaster recovery, and compliance requirements
- **Network** has been split within three sub-towers: LAN/WAN, voice, and transport. They cover the devices, labor, and services for the on premise equipment (PBX, VoIP voice mail), internet access, telecom and communication services, and mobility
- **Platform's** four sub towers are about the database, middleware, mainframe database, and mainframe middleware. DBA's DBMS, tools and operational support, applications and related developments are listed in
- Central print belongs to the **output** tower. The activities of customer billing or customer documentation support fall into this tower
- The **end user** tower comes with seven sub towers. Some elements of these sub towers include:
  - **Workspace:** physical desktops, portables, peripherals (monitors, personal printers...)
  - **Mobile devices:** tablets, smart phones and apps used
  - **End user software:** the software used to author, create, collaborate, and share documents and other contents. It includes emails, communications, messaging, word documents, spreadsheets, presentations, desktop publishing, graphics
  - **Network printers:** all network printers used by the individuals (with the exception of the personal printers), as well as copy rooms
  - **Conferencing and AV:** Audio and Video conferencing equipment
  - **IT Help Desk:** the centralized Tier 1 help desk that handles user requests and resolves issues
  - **Deskside Support:** resources in charge of moves, adds, changes, and hands-on issue resolutions
- Application development (analysis, design, development, code, test and release packaging services, QA) as well as their support and operations are part of the **application** tower together with the business software (licenses, maintenance, and support)
- **Delivery** relates to the IT service management, program–product–project management, client management (allowing the organization to understand the business needs, to communicate on IT products, services, and status of IT projects), and the operation center resources involving the monitoring and interventions on the whole IT, such as NOC, GOC, or SOC
- The **security and compliance** tower comes with three sub towers. The sub-towers cover the activities in charge of defining, establishing, implementing, and controlling the policies, processes, and means. Cybersecurity and all the security components fall into this sub-tower as well. The disaster recovery sub-tower relates to all the resources allocated for the business continuity management activities (BCP, DRP). The actions coming out of this tower (implementation of server, new controls, new security filters) are part of their respective towers (compute, storage, network, end-user)
- **IT Management** encompasses all the IT managing and strategic planning (CIO, IT Leaders, administrative support), enterprise architecture (business information, architecture standardization), IT finance (planning, budgeting, spend management and chargeback of IT expenditure, costing of IT products and services), and IT vendor management (selection, contract management, oversight, performance management of third party vendors and external service providers) sub-towers.

Figure 1: IT Towers and Sub-towers

Data Center
- Enterprise Data Center
- Other facilities

Compute
- Servers
- Unix
- Midrange
- Converged Infrastructure
- Mainframe
- High Performance Computing

Storage
- Online Storage
- Offline Storage
- Mainframe Online Storage
- Mainframe Offline Storage

Network
- LAN/WAN
- Voice
- Transport

Platform
- Database
- Middleware
- Mainframe Database
- Mainframe Middleware

Output
- Central Print

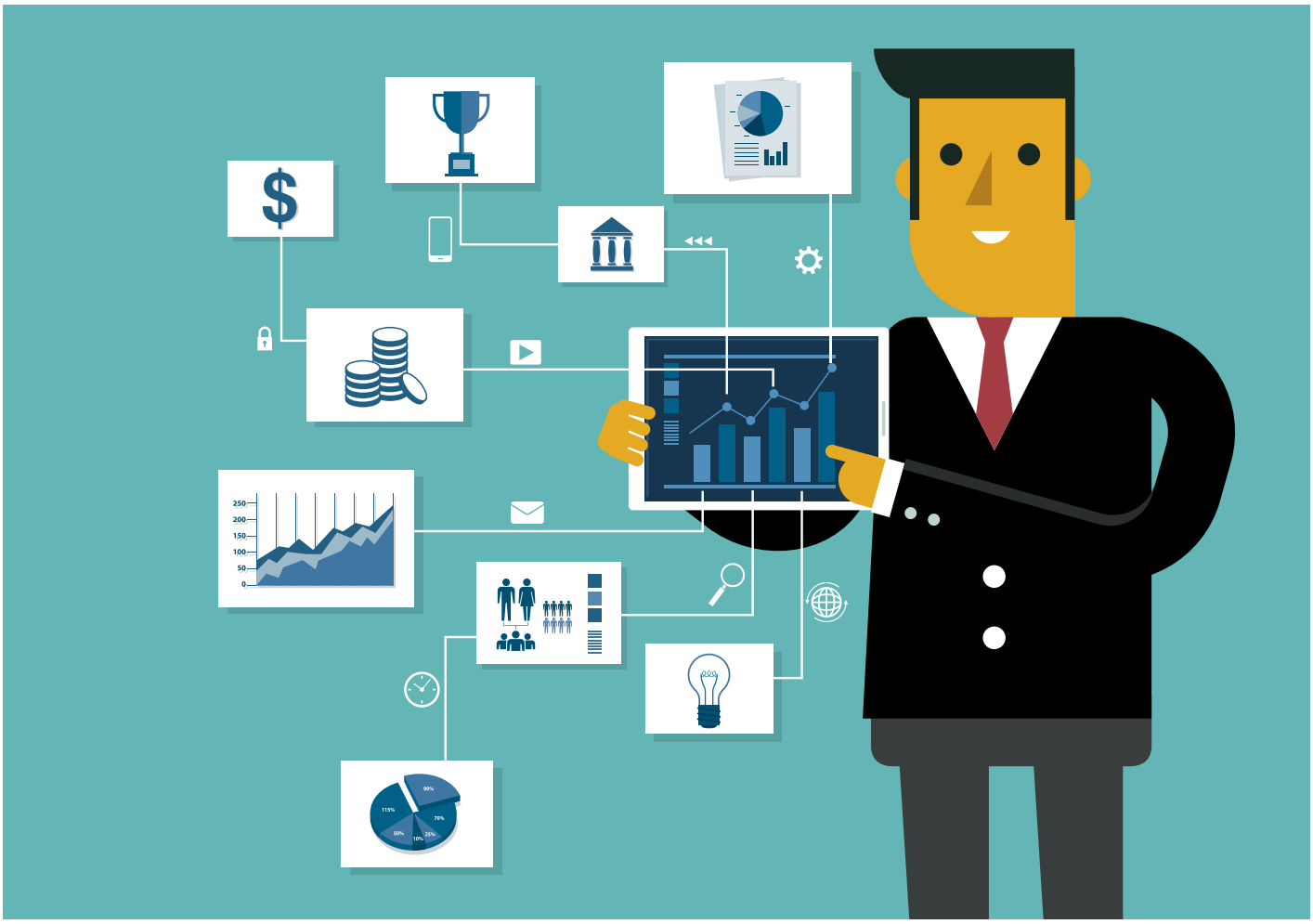
End User
- Workspace
- Mobile Devices
- End User Software
- Network Printers
- Conferencing & AV
- IT Help Desk
- Deskside Support

Application
- Application Development
- Application Support and Operations
- Business Software

Delivery
- IT Service Management
- Operations Center
- Program, Product and -
- Project Management
- Client Management

Security and Compliance
- Security
- Compliance
- Disaster Recovery

IT Management
- IT Managmeent and Strategic Planning
- Enterprise Architecture
- IT Finance
- IT Vendor Management



Technology Business Management starts with the implementation of a framework, which enables transparency of costs, tracking of the resource consumption, and evaluation of the performance.

Figure 2: Standardized TBM Taxonomy

Business

The last layer is about what is visible by end consumers (being either business leaders, end users, or external parties). The taxonomy defines a hierarchy from **Service Type** to **Service Category** and **Service Name**. Customer-specific modifications can be handled within a fourth layer labeled **service offering**.

There are six service types in the taxonomy, which fall into 23 service categories and 93 service names. All service types, service categories, and service names are illustrated in figure 3.

Figure 3: All service layers in the TBM taxonomy

End user services

SERVICE CATEGORY	SERVICE NAME	
Client computing	• Computer • Mobile	• Bring Your Own Device • Virtual Client
Communication & collaboration	• Collaboration • Communication	• Productivity • Print
Connectivity	• Network Access • Remote Access	

Business Application services

SERVICE CATEGORY	SERVICE NAME	
Product Management	• Product Development • Product Planning	
Sales & Marketing	• Customer Analytics • Marketing & Advertising	• Sales Force & Channel Mgmt • Customer Sales
Manufacturing & Delivery	• Resource Planning • Manufacturing • Inventory & Warehousing	• Product Delivery • Service Delivery
Customer Service	• Order Mgmt • Customer Care	
Finance	• Financial Planning • General Acct'g • Revenue Acct'g • Fixed Assets • Payroll • Procurement	• Accounts Payable • Treasury • Tax • Consolidation • Internal Control
Human Resources	• Recruiting • Talent Mgmt	• Workforce Mgmt
Facilities & Assets	• Equipment • Facilities	
Cross-Function Capabilities	• Enterprise Knowledge Mgmt • Corporate Communications	• Legal

Delivery services

SERVICE CATEGORY	SERVICE NAME	
Strategy & Planning	• Technology Business Mgmt • Innovation & Ideation • Enterprise Architecture	• Program, Product & Project Mgmt • Business Solution Consulting • IT Vendor Mgmt
Development	• Design & Development • System Integration	• Testing
Support	• Service Desk • Application Support	• IT Training • Central Print
Operations	• IT Service Mgmt • Event Management • Scheduling	• Capacity Mgmt • Deployment & Administration
Security & Compliance	• Security • Governance, Risk & Compliance	• Business Continuity & Disaster Recovery

Platform services

SERVICE CATEGORY	SERVICE NAME	
Data	• Database • Distributed Cache • Data Management	• Data Warehouse • Data Analytics & Visualizations
Applications	• Application Hosting • Message Bus & Integration • Content Mgmt • Search	• Streaming • Machine Learning & Artificial Intelligence

Infrastructure services

SERVICE CATEGORY	SERVICE NAME	
Data Center	• Enterprise Data Center	• Other Data Center
Network	• Data Network • Voice Network • Internet Connectivity	• Virtual Private Network • Domain Services • Load Balancing
Compute	• Physical Compute • Virtual Compute & Containers	• Compute on Demand • Mainframe
Storage	• Networked Storage • File & Object Storage	• Backup & Archive • Distributed Storage (CDN)

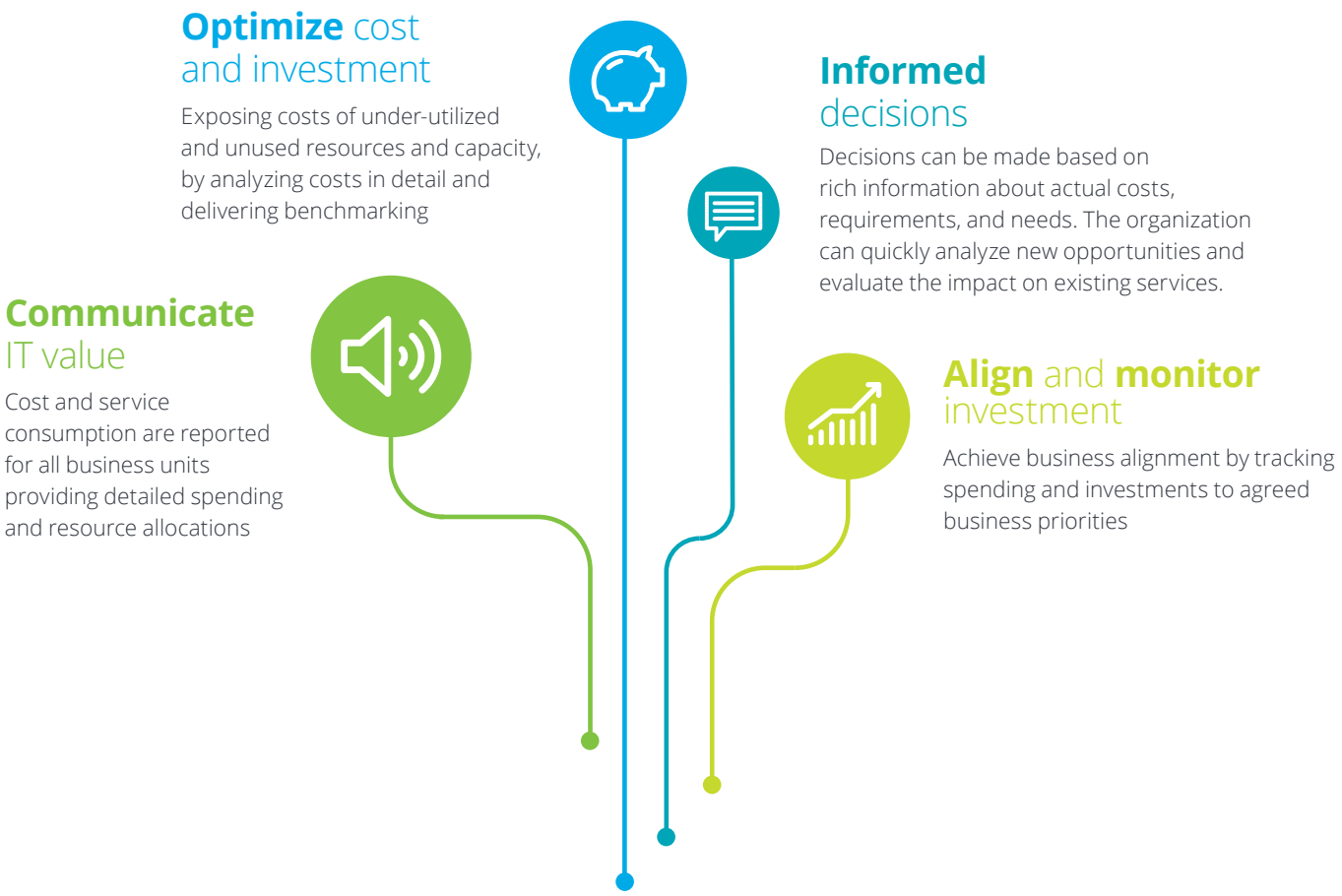
Emerging services

SERVICE CATEGORY	SERVICE NAME	
Emerging	• Internet of Things (IoT) • Virtual Reality / Augmented Reality	• Blockchain

Questions raised to the C-level are moving away from "how much do you spend in IT" to "what value do you get from your IT spent."

Aside from the mandatory taxonomy objects and layers, the models need data to be incorporated (usually the general ledger), and allocation rules and metrics to be defined. Altogether, understanding data-driven IT investment decision making and the associated articulation of business value delivered builds trust in IT, makes IT credible, and transforms IT's interaction with business units.

In our world where digital is key to the delivery of any business, CIOs and other leaders have to act as digital leaders in their organizations. They must align their business strategy with their IT delivery and IT strategy. They must be able to prioritize the business performance and growth by taking advantage of an underlying IT where costs, performance, capability, and forecast are under control in a timely manner.
If business needs to take advantage of the cloud, then a technical assessment of the existing and potential solutions is usually conducted. However, a financial assessment is also required. Comparing different sourcing models (from your organization, from external providers, physical or virtualized solutions) is not easy. For example, on the cloud side, the cost of one virtual machine is linked to CPU and memory. On the internal side, you need to include the (virtual or physical) server costs (purchase, license, maintenance, manpower) but also the power, facility and telco costs, the helpdesk, a proportion of shared services like HR, and business facilities.



The main benefits to organizations

How should the internal costs evolve if the business is growing? Are all the internal and shared costs taken into account? The use of TBM will then outperform the spreadsheets and other tools, as it will allow the decision makers to gain visibility and control over the cost pools, the IT towers, and the applications and services. TBM is a solution that enhances your capacity to evolve. Questions raised to the C-level are moving away from "how much do you spend in IT" to "what value do you get from your IT spent." Being able to answer this question in a structured and coherent way, with an evolving landscape, in a timely manner, is one key factor of a modern company.

Conclusion

Implementing a framework such as TBM not only generates the necessary transparency required today, but also raises the service maturity of organizations, by which they can start becoming a true service delivery organization. This is what the overall goal of Technology Business Management is driving and delivering technology services as a business. Good luck.

Current cloud challenges are (likely) not what you think they are. Are you up-to-date?

Stéphane Hurtaud
Partner
Risk Advisory
Deloitte

Jesper Nielsen
Director
Technology & Enterprise Application
Deloitte

Benoit Sauvage
Senior Manager
Strategy Regulatory & Corporate Finance
Deloitte

Many organizations still struggle to understand how cloud computing and "X-as-a-Service" should be translated into tangible and actionable strategies and hence take advantage of its potential. However, some organizations have been successful and leaders who have started a successful cloud journey have understood what is required in order to draw such advantages.

Cloud solutions still have challenges, but they might not be what you would expect. In recent years, many cloud services have developed into mature enterprise-ready services and the challenges have changed accordingly.

As cloud services are defined by the delivery- and operational-format of directly consumable technology services, it is important that technology leaders focus on how to integrate, manage, and deliver such services as part of their service portfolio. An over-emphasis on technology—while some level certainly is necessary—is unlikely to provide the business value expected from cloud services.

So what are the current main challenges in doing so and is it worth the effort? We have compiled a list of what we currently consider to be the main relevant challenges. This list of potential challenges is certainly not exhaustive, nor does it necessarily contain the challenges you might encounter, but it is likely that you will meet some of these challenges on your cloud journey.

The current main challenges has been summarised here below.

- Organizations fail to base their cloud strategies on service strategy aligned with business requirements
- Heavily increased cybersecurity threats and the impacts for on-premises vs. cloud solutions
- Some applications are only available as X-aaS models, so how can seamless integration be assured with existing technology services?
- Access to storage solutions in the cloud is becoming commonplace, but how should organizations use them?
- Orchestration of multi-cloud environments has proven difficult and should be included in the integration strategy and operational planning to avoid service downtime
- The cost of cloud solutions is not always competitive. How can I achieve the best TCO?
- The Internet of Everything (IoE) is emerging and will require organizations to adapt, especially if they are using cloud services. What should they expect?
- 5G is arriving (soon), but how will that affect cloud architectures, possibilities, and performance?

As when building new technology services, ordering a new (cloud) service requires the same level of alignment with business strategies and needs as you are used to. As cloud services are standardized, tailoring such services can be difficult or impossible (and costly). This does not, however, suggest that a strong alignment should not take place. Failing to understand the desired business outcomes often results in a lack of value delivered to the business.

From an IT department perspective, there are several areas that must be discussed and aligned. Mainly governance, operations, and automation are still seen as a challenge to overcome. Many of the existing on-premise processes and procedures cannot be used directly for cloud solutions.

One challenge is that some applications are only available as X-as-a-Service solutions; hence, if the business case selects such services, the organization must find ways to deal with the new and changing challenges. The major challenge we see is related to the overall architecture, which requires a strong hybrid cloud strategy to be in place. The architecture challenge is not just a technology challenge, but also operational. These many challenges range from seamless network connectivity and well-managed latency networks, to operational processes and log management (to name but a few).

Most (if not all) of the large-play cloud providers take security very seriously and spend a considerable amount of money and effort on providing state-of-the-art secure solutions. Their spending is often considerably higher than what even large multinational organizations are able to spend on cybersecurity and data protection. As these cybersecurity threats become more sophisticated, the protection mechanisms need to follow closely behind. For that, cloud providers are much better prepared and are able to bring new measures to bear, faster and with better integration, providing robust services even with changing security vectors.

The major challenge we see is related to the overall architecture, which requires a strong hybrid cloud strategy to be in place.

Regulation often does not address new service types very well. This is also the case for cloud solutions, where much existing and new regulation (e.g., GDPR) must be adhered to. There are other regulations that must be considered when cloud service providers are selected (e.g., US Cloud Act). Ensuring sufficient and strong knowledge of relevant regulations is necessary for successful cloud strategy implementation.

One of the cloud solution types experiencing the largest growth is Storage-as-a-Service. These solutions are scalable and tend to offer very competitive pricing. This leads to organizations using many storage-intensive solutions in the cloud, e.g., Big Data or advanced analytics solutions. This can be simple if the solutions are largely stand-alone and only require occasional data uploading/downloading, but if that is not the case, a premium will have to be paid on the connectivity side. These solutions also bring data protection to the forefront, as many include personal identifiable data or sensitive data sets.

Cloud solutions are mainly used to save money, right? With well-implemented solutions based on a strong strategy, it is absolutely possible to lower the TCO/TEI for a solution in the cloud compared with on-prem solutions. It is not always the case, however, that the TCO/TEI is reduced using cloud solutions and it is absolutely necessary to make a business case in advance in order to explore the full truth of what the total costs really are. This applies both for on-prem and cloud solutions.

Mature IT organizations use Technology Business Management (TBM) practices; therefore, they know and understand their detailed cost model and hence the real cost of delivering their business services (described in a service catalog). If that is the case, it is relatively easy to build a strong business case. If, however, the organization is not fully aware of the actual costs going into offering a service, the business case is always going to be flawed or based on a large set of assumptions.

We are all aware that the Internet of Things (IoT) is emerging, and many organizations have started to take advantage of it. This is mainly done in an M2M manner where computer systems and devices/sensors communicate directly with each other. For situations when this communication paradigm shifts to include M2P (Machine to People) and P2P (assisted by technology solutions), Cisco has coined the term Internet of Everything (IoE). This introduces user-generated communication and interactions that are much more difficult to deal with, and where specialized systems are often required. The variety of systems and overall complexity of interfaces and interconnectivity make it likely that such systems will be exclusively cloud-based. Any organization needing to use IoE services will therefore have to understand and be able to manage and operate those cloud solutions.

When sensors/devices are connected in any configuration (M2M, M2P, or P2P) there are new challenges to overcome. Connectivity is certainly critical and can be difficult to ensure if the amount of devices is high and they are geographically spread out. Therefore, devices are often connected to a mini-cloud (sometimes called fog-computing) where processing can also take place. These solutions hugely simplify the connectivity. Devices and sensors, however, also need to be updated and calibrated regularly. To ease that task, specialized tools and teams must be deployed, as this is not currently a task normally undertaken by IT departments. Leaving this to specialized organizations is likely to be advantageous, and a new (cloud) service type is required.

With the arrival of 5G around the corner, network connectivity will make yet another paradigm shift. Not only will users be able to perform any task without wired networks, but 5G will provide possible integration of IoT and IoE into the corporate organization. This in turn creates the need for many real-time applications and services, which are often best provided in the form of cloud services.

Many organizations are still coming to terms with virtualized infrastructures, containerization, and software-defined data centers. Still more have not begun automating and standardizing their services into a strong service catalogue, where the supplied business value is clear. Without deep understanding of the technical and operational aspects, it is unlikely that IT organizations will be able to handle such real-time application infrastructure. Moreover, with the quickening pace of new services on the market, it will likely be a challenge for IT organizations to simply take advantage of this and orchestrate new business services.

Concluding remarks

Does this mean that organizations should not use cloud services and should in fact try to avoid them? That would be a huge mistake, as cloud services have become an integral part of architectures and service delivery mechanisms, and their importance will only increase in the coming years. IT organizations must learn how to use cloud services as part of their delivery mechanisms and how to orchestrate, as well as manage and govern, these solutions.

The good news is that a lot of help is available for organizations, from free articles and self-learning courses, to studies and professional services in diverse related topics. Getting started correctly, or indeed ensuring the current strategy is up-to-date, is critical, and with the increased reliance on cloud solutions, every organization must ensure a strong cloud strategy exists, as well as the implementation of a well-informed cybersecurity policy.

CLOUD Act overview

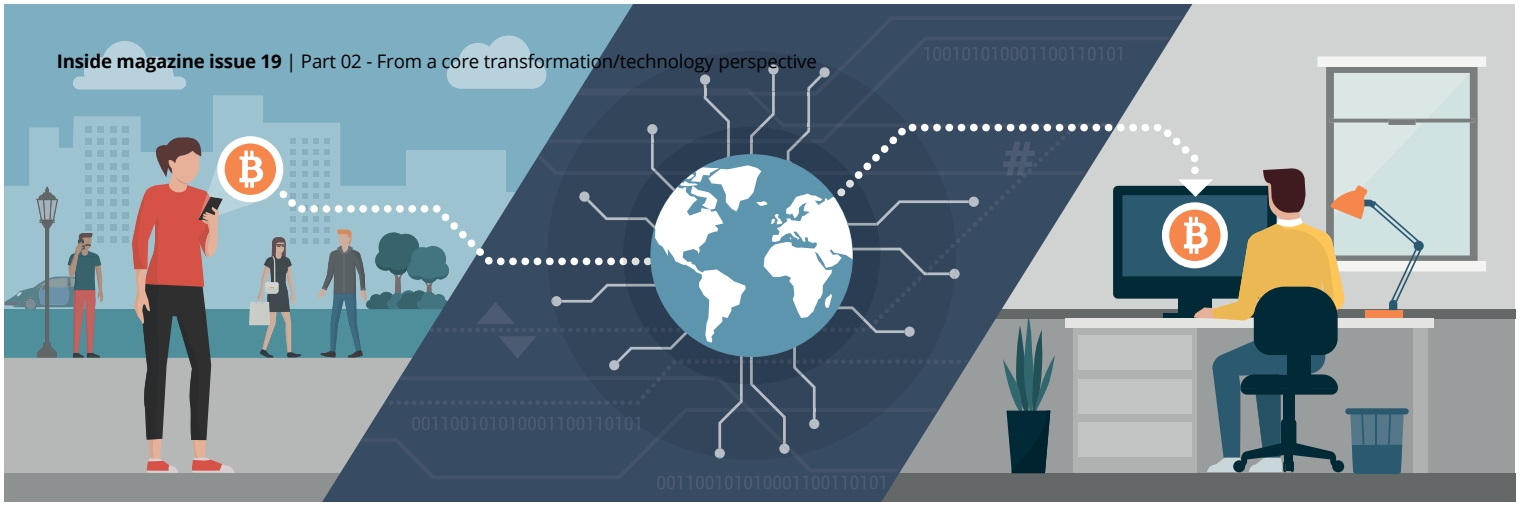
The Clarifying Lawful Overseas Use of Data Act, or CLOUD Act, was enacted into US federal law on 23 March 2018. The CLOUD Act allows US law enforcement authorities to compel US-based technology companies via warrant or subpoena to provide requested data stored on servers regardless of whether the data is stored in the US or on foreign soil.

Before the adoption of the CLOUD Act, the US could only access data stored overseas through mutual legal-assistance treaties (MLATs). MLATs are sovereign state to sovereign state treaties concerned with how the sovereign states are willing to help each other with legal investigations. Now, using the CLOUD Act, US law enforcement officials at any level, from local police to federal agents, can force companies (providing an "electronic communication service or remote computing service") to turn over user data regardless of where the company stores the data. CLOUD gives the executive branch the ability to enter into "executive agreements" with foreign nations, which could allow each nation to access user data stored in the other country, no matter the hosting nation's privacy laws. These agreements do not require congressional approval.

Potential conflict with GDPR

On the surface, there is clear scope for potential conflict between the CLOUD Act and the GDPR. Article 48 of the GDPR states that electronic data can only be transferred when there is a recognized international agreement in place between the member states and the requesting third country (such as the MLAT), however, section 2713 of CLOUD circumvents this and only talks about possible executive agreements with other countries.

One possible resolution would be for the US to enter into an "executive agreement" in compliance with the CLOUD Act procedures. However, the true level of conflict between these two data regulations is yet to be seen. It is unclear whether the data protection authorities in the EU will aggressively prosecute companies that comply with a CLOUD Warrant. For the time being, companies need to be mindful of with whom their data is stored and take measures to understand their obligations under both the GDPR and the CLOUD Warrant.



The tokenization of assets is disrupting the financial industry. Are you ready?

Patrick Laurent
Partner
Technology & Enterprise Application
Deloitte

Thibault Chollet
Director
Technology & Enterprise Application
Deloitte

Michael Burke
Consultant
EMEA Blockchain Lab
Deloitte

Tobias Seers
Analyst
Strategy Regulatory & Corporate Finance
Deloitte

From art to buildings, the way we invest in assets could be about to fundamentally change with the arrival of tokenization. The act of tokenizing assets threatens to disrupt many industries, in particular the financial industry, and those who are not prepared risk being left behind.

What is tokenization?

The tokenization of assets refers to the process of issuing a blockchain token (specifically, a security token) that digitally represents a real tradable asset—in many ways similar to the traditional process of securitization, with a modern twist. These security tokens are created through a type of initial coin offering (ICO) sometimes referred to as a security token offering (STO) to distinguish it from other types of ICOs, which can produce different tokens such as equity, utility, or payment tokens. An STO can be used to create a digital representation—a security token—of an asset, meaning that a security token could represent a share in a company, ownership of a piece of real estate, or participation in an investment fund. These security tokens can then be traded on a secondary market.

Benefits

A new "token economy" offers the potential for a more efficient and fair financial world by greatly reducing the friction involved in the creation, buying, and selling of securities. We see four key advantages that tokenization provides for both investors and sellers:

- **Greater liquidity**
  By tokenizing assets—especially private securities or typically illiquid assets such as fine art—these tokens can be then be traded on a secondary market of the issuer's choice. This access to a broader base of traders increases the liquidity, benefiting investors who consequently have more freedom and sellers because the tokens benefit from the "liquidity premium," thereby capturing greater value from the underlying asset.
- **Faster and cheaper transactions**
  Because the transaction of tokens is completed with smart contracts (software algorithms integrated into a blockchain with trigger actions based on pre-defined parameters), certain parts of the exchange process are automated. This automation can reduce the administrative burden involved in buying and selling, with fewer intermediaries needed, leading to not only faster deal execution, but also lower transaction fees.
- **More transparency**
  A security token is capable of having the token-holder's rights and legal responsibilities embedded directly onto the token, along with an immutable record of ownership. These characteristics promise to add transparency to transactions, allowing you to know with whom you are dealing, what your and their rights are, and who has previously owned this token.
- **More accessible**
  Importantly, tokenization could open up investment in assets to a much wider audience thanks to reduced minimum investment amounts and periods. Tokens are highly divisible, meaning investors can purchase tokens that represent incredibly small percentages of the underlying assets. If each order is cheaper and easier to process, it will open the way for a significant reduction of minimum investment amounts. Moreover, the higher liquidity of security tokens could also reduce minimum investment periods since investors can exchange their tokens on the secondary markets, which are theoretically global and 24/7 (subject to regulatory limits).

We foresee that tokenization could make the financial industry more accessible, cheaper, faster and easier, thereby possibly unlocking trillions of euros in currently illiquid assets, and vastly increasing the volumes of trades.

These advantages most clearly apply to asset classes that are typically considered illiquid and can benefit from improved transparency, efficiencies, and lower minimum investments. Two areas are particularly interesting when considering the possibilities of tokenization: real estate and fine art. Rather than requiring very large investments, or tying up your money for extended periods with your investment split across a number of other assets in the fund, tokenization could permit you to invest €50 in the piece of art or specific building in which you are interested, and then easily sell the token at your discretion. This ability to freely choose where you invest will open up a new era of much greater personalization and customization in investment—an area that is increasingly relevant as investors now look beyond just returns and pay much closer attention to where their investments are made.
There are already a number of companies helping to build the infrastructure to support the growth of the token economy. Companies like Tokeny, a platform to issue and manage security tokens, as well as digital marketplaces like tZERO and privatemarket.io, are just a few of many that are driving the concept of tokenization.

We foresee that tokenization could make the financial industry more accessible, cheaper, faster and easier, thereby possibly unlocking trillions of euros in currently illiquid assets, and vastly increasing the volumes of trades.

Challenges

Some obstacles need to be overcome, however, if tokenization and the broader token economy are to take off. A big problem revolves around regulatory alignment, especially considering the fact that blockchain-based platforms are de facto decentralized. Security regulations are typically technology agnostic, meaning that security tokens, depending on their exact features, can fall under the full scope of relevant security regulations, which can vary significantly from jurisdiction to jurisdiction. This is true not just for the creation and initial sale of the tokens, but also for trading them on secondary markets. Consequently, many of the advantages of tokenization are undermined if regulations prevent the free and international exchange of security tokens. What is needed are compliant methods of creating and exchanging tokens in a domestic and, ideally, international scope. International regulatory alignment is an unlikely milestone in the near future, but adding clarity to the regulatory environment for security tokens and facilitating compliant involvement in the token economy is a possible and necessary path forward if the opportunities are to be realized.

Some companies are already helping to solve the compliance issue. Harbor, for example, aims at embedding compliance at the token level, thereby checking if a trade is compliant, taking into account who the buyer and seller are, and where the trade occurs. If it is compliant, the trade can happen on any token exchange. More development in this area to facilitate the easier creation and sale of tokens is needed to move forward.

Additionally, regulations specific to tokens or, at the minimum, clear guidance from regulators would be welcome, since there is often uncertainty as to how a security token should be considered within the law. While it may seem counterintuitive to encourage regulation of a technology with decentralization and independence as some of its core characteristics, it is important to consider the risks of not providing a legal and safe framework in which the technology can thrive. A lack of scrutiny can allow scams and open the door to hacking—something particularly relevant for a relatively nascent technology. Scams and hacks not only harm investors and the broader economy, but enough of them could discourage investors and cripple the token economy completely.

There has been a considerably uneven approach so far to regulating and accepting tokenization, but there are signs that the traditional market infrastructure is adapting to the token economy. For example, both the US SEC and EU's ESMA have made comments, albeit generic, in this area. Meanwhile, Malta and Switzerland have made more progressive plans to accommodate new marketplaces for tokenized securities[1]. Having a clear regulatory framework is of vital importance

for the safe development of the token economy. In the meantime, a set of common good practices and rules would be a good foundation.

Beyond regulations, as with any new technology or solution, some questions need addressing. How tokens will remain linked to the real asset that they represent is a point of concern. For example, imagine if you own tokens representing a small fraction of 100 gold bars at a bank, and five bars are stolen. What happens to your token and to the other token owners is crucially important, since the value of tokens becomes greatly undermined if they cannot be proven to be linked to real-world assets. Another point of consideration is the issue of governance. If ownership of an asset, such as a building, is split among thousands of people, there is little incentive for owners to bear the costs associated with that asset, such as maintenance and ensuring rent is collected. There are also concerns related to risks of hacking that any digital or online products have, as well as stability concerns with a hyper-liquid market. These are problems that will likely be overcome or minimized, but they require thought and possibly intermediaries of some sort.

Once those critical issues about the functioning of the token economy can be answered, and there is progress on the regulatory front, tokenization might become increasingly present across the financial industry.

"As a technical enabler for STOs we see a rapidly growing demand from investment funds and established companies to tokenize their shares and increase liquidity for their investors."

Luc Falempin, CEO, Tokeny

1 Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law—link", pp. 5-6; https://techcrunch.com/2018/07/19/malta-paves-the-way-for-a-decentralized-stock-exchange/; https://www.six-group.com/en/home/media/releases/2018/20180706-six-digitalexchange.html.

This movement will involve actors from all levels (governments, central banks, private companies, and even local communities), and will depend on their communal effort to move tokenization forward. If the abovementioned issues are addressed, as adoption increases and overhype—which undermines the true value of the token economy—dies down, the token economy might take off rapidly, with ripple effects throughout the financial services industry and broader economy.

What financial institutions will need to consider in order to take part in the token economy

The token economy represents a remarkable power shift from large, centralized trust agents to the individual. Cryptology replaces third-party intermediaries as the keeper of trust, with blockchain participants running complex algorithms to certify the integrity of the ledger of transactions. Financial institutions must determine how they are going to adapt to the token economy. We see major areas that financial institutions must consider if they wish to remain relevant in the token economy:

- **Business model**
  Financial institutions will have to choose where to play in the value chain. For example, they might choose to advise issuers on how to structure their token, or could act as safe keeper of the tokenized asset (art, real estate property, luxury vintage car, etc.). They could also leverage their expertise as custodian banks or paying agents to create life cycle event transactions on the distributed ledger or, in a more advanced model, implement life cycle processing in smart contracts and deploy them on a public blockchain platform. At the other end of the value chain, they could offer services to maintain customer accounts in cryptocurrencies and tokens or prefer to act as central distributors facilitating access for their clients to transact on diverse tokenization platforms or token exchanges.
- **Platform integration**
  Depending on the business model they choose to embrace, they will implement different operating models. One of the main components of those new operating models being the blockchain platform, they will have to choose which platforms they will work or collaborate with. This will depend on the regulation they have to follow, the type of products or services they will offer to their clients, and other factors more related to the platform itself, such as its product strategy, and its potential as regards the type and size of the user community.

  Institutions need to consider an infrastructure that will provide both technical and economic solutions to their business model while also taking into account the effect it will have on downstream systems. Added to this, if the new platform cannot integrate with legacy systems, institutions may face a partial re-platforming of their information system.
- **Cybersecurity**
  With digital payments reaching US$721 billion in 2017, and the growing popularity of bitcoin and other cryptocurrencies, tokens are increasingly becoming targeted by cybercriminals. While the distributed ledgers themselves implement a high degree of cybersecurity measures at their core thanks to cryptology and consensus among

multiple nodes, the whole ecosystem does have some possible weak points at its edges that need to be properly secured. One of them lies in the management of the wallets and private keys that control them; it could also be man-in-the-middle attack or advanced social engineering to steal private keys. Not only shall the financial institutions consider implementing proper security measures to secure the whole value chain when they run or interact with blockchain platforms, but they might also consider proposing a new kind of service to their customers, for instance, to securely store their wallets and keys. With this in mind, institutions need to carefully plan for cybersecurity at different levels from network and infrastructure, through systems, to applications, and consider the opportunity of differentiation through advanced cybersecurity prevention.

- **Compliance**
  MiFID, Anti-money laundering (AML), know your customer (KYC), and other regulations are at the center of any financial institution's obligations when it comes to client service. In the token economy in which business interactions are more direct, expeditious and irreversible, operational measures to comply with regulations will have to be adapted, potentially becoming more upstream, factorized, and standardized. Institutions should not reinvent the wheel, but collaborate with new actors such as tech startups, KYC utilities, or blockchain analytics software vendors to implement new operational measures and demonstrate to the regulators that they remain compliant while operating in the digital space.
  We can imagine that, in the near future, KYC processes would likely be realized once by a specialized KYC utility, encoded in a self-sovereign digital identity, and used by customers each time they enter into a relationship with a new financial institution. Provided that they have consent from the customer, financial institutions will transfer the reference to this identity down the value chain so that other institutions know with whom they are dealing, such as a crypto-exchange transferring the identity to a bank. This will speed up the on-boarding process, reduce the overall cost of KYC compliance and, at the same time, enable more direct and rapid interactions that are fundamental to the token economy.

  Another area that will be affected is taxation. Financial institutions that are responsible for processing some tax will have to adapt their information systems and processes to compute and deduct certain tax schemes, such as withholding tax. Part of that processing might be encoded in a smart contract and automated, and as long as the tax authorities do not accept payment of tax in cryptocurrencies, financial institutions will remain in the taxation ecosystems.

  Industry Practicality Current industry capability and viability implications are a key hurdle in the adoption process. For example, within asset servicing, if a fund is tokenized, will all the underlying assets need to be tokenized and a smart contract created for the daily NAV production so as to have a near-live token price for the fund unit? The emerging landscape of this regulatory thinking is developing at a faster pace in emerging markets, like Singapore, rather than traditional Western economies.

- **Jurisdiction**
  With legislative and regulatory frameworks differing from jurisdiction to jurisdiction, financial institutions must ensure tokens remain compliant both in the issuer's as well as in the investor's multiple jurisdictions (e.g., a Canadian seller and Japanese buyer). They should implement measures to prevent investment by customers from jurisdictions with which a token they offer or give access to is not compliant. This is especially true for institutions that have a global scale.

We expect that with the spread of tokenization there will be new actors, new roles, and new services. A decentralized financial system does not guarantee one without financial institutions, and prepared and forward-thinking institutions will be those that are most able to embrace the token economy. Traditional players will have the opportunity to meet the new demands of a token economy, be it a provision of platforms for storing tokens, or acting as trusted intermediaries for when the blockchain alone is not enough. Those that do not rise to the challenge will struggle in the face of fierce competition for an exciting new, tokenized world.

Conclusion

- Tokenization allows the creation of a new financial system—one that is more democratic, more efficient, and more vast than anything we have seen.
- Tokenization is already a reality. New players are rapidly building their own infrastructure, while the traditional market infrastructures are also showing signs of paving the way for mainstream adoption.
- Obstacles stand in the way of widespread adoption, principally in the form of regulation. But these obstacles can be overcome with the support of actors from all levels.
- Only institutions that engage with the technology, plan for the future, and adapt to the realities will thrive

Can blockchain accelerate financial inclusion globally?

Marco Lichtfous
Partner
Operations Excellence
& Human Capital
Deloitte

Vivek Yadav
Senior Manager
Operations Excellence
& Human Capital
Deloitte

Valentina Fratino
Analyst
Operations Excellence
& Human Capital
Deloitte

Financial products and services drive the world's development and reduce poverty. However, more than 1.7 billion individuals globally currently lack the most basic financial services and therefore cannot adequately invest in their health, education, and entrepreneurship. Recent progress has been driven by a new generation of financial services accessed via mobile phone and the internet. Decentralized digital currencies—empowered by their underlying blockchain technology—have caused quite a stir in the tech and financial community, and its potential for empowering financial inclusion is being tested globally.

Blockchain could have the potential to facilitate remittances for migrants seeking to transfer small amounts of money overseas; blockchain could provide a decentralized global bank account relieving financially excluded individuals from having to set one up with formal financial institutions; and blockchain could provide the basis for a richer set of financial services.

Try to imagine living without access to any of the most basic financial services that many of us living in developed countries take for granted: no possibility to open a banking account, therefore no possibility to obtain a debit or credit card, to get a car loan or a mortgage, or any support to help get through a difficult month. It sounds hard, doesn't it? In essence, bank accounts constitute the first step toward financial inclusion.

Financial inclusion is the provision of access to appropriate, affordable, and accessible financial products and services to vulnerable and low-income individuals in a fair, sustainable, and transparent manner by institutional players[1] *(Reserve Bank of India, 2018)*. Accounts allow individuals to store money and build savings for the future. Savings expand investment possibilities, satisfy entrepreneurial goals, provide guarantees for children's education, and ensure adequate mitigation of financial shocks. Accounts allow the possibility of extending short-term micro loans to self-employed individuals and thus create opportunities for themselves as well as for their communities. Additionally, having access to bank accounts makes it easier to send and receive payments via remittances, which are cross-border person-to-person payments of relatively low value, typically recurrent within migrants[2]. Remittances act as a catalyst for financial inclusion; in 2017, remittance flows were larger than Official Development Assistance (ODA) and represented up to a third of several low-income country GDPs[3].

"If we solve these large problems of financial inclusion it will be with new business models, technologies and innovations."

Roger Voorhies
The Bill and Melinda Gates Foundation, 2014.

1 Reserve Bank of India, 2018
2 The World Bank, 2018
3 The World Bank, 2018

As of today, account ownership is universal in high-income economies, as 94 percent of adults hold an account; whereas in low and middle-income economies, this share is 63 percent. In 2017, The World Bank estimated that 1.7 billion individuals do not hold an account within a financial institution[4]. This segment of the population is referred to as the unbanked. The unbanked survive on less than two dollars per day and are mostly located in Africa, Asia, Latin America, and the Middle East. Not all who are considered as banked are equal. Alongside the unbanked, it is important to highlight the underbanked. This segment has limited or non-transactional access to financial services. The underbanked use money orders, check cashing services, payday loans, and other instruments offered through semi-formal or informal providers rather than traditional financial institutions or credit unions. Together these two segments account for 3.5 billion financially excluded individuals worldwide[5].

The worrying landscape of financial inclusion is not limited to individuals only. Indeed, according to the International Finance Corporation, globally more than 200 million small and medium enterprises (MSMEs) in developing countries find it hard to access the traditional banking system[6]. MSMEs are crucial to economic growth and future development in emerging markets, as they contribute almost 50 percent of total employment and up to 33 percent of GDP[7]. Precisely, more than 40 percent of developing countries' MSMEs have encountered several obstacles and burdens in accessing a financial account[8].

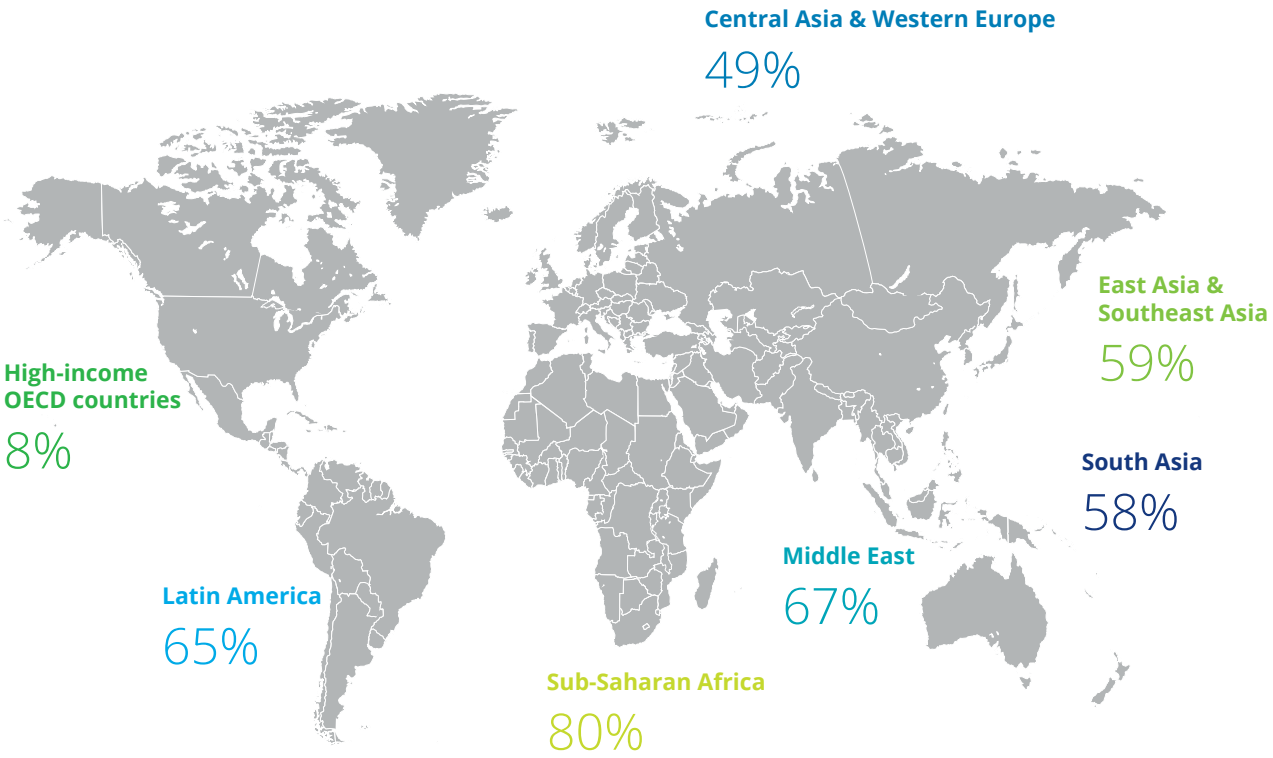
When governments and industry stakeholders are unable to provide inclusive financial systems, the world's poorest rely on their limited savings in cash, which is unsafe and difficult to manage. Non-inclusive financial systems contribute to alarming income inequalities and slower economic growth[9]. The question to ask when looking at the positive effects of globalization and digitalization is: why are individuals and MSMEs in developing countries still financially excluded?

The reasons for the unbanked and underbanked not having an account:

- Geographical access to financial institutions is limited
- Insufficient funds to operate an account
- Financial services are too expensive relative to income
- Lack of necessary personal documentation (ID, passport, etc.) to formally open an account
- Family member already has an account
- Religious reasons
- Lack of trust toward financial institutions

Source: Global Findex Database, World Bank Group

Unbanked population by region (%)



200+ million
Micro, small, and medium enterprises without access to banking services

1.7 billion adults
Global Unbanked Population

Source: Findex database, World Bank Group

This is alarming and calls for immediate action. A growing number of governments, foundations, and international institutions have shown their commitment to the advancement of financial inclusion, prioritizing this issue in their agendas. For example, the Bill & Melinda Gates Foundation has launched several initiatives to extend the access to financial services for the unbanked and underbanked, while the United Nations and its member states have indicated financial inclusion as a pivotal enabler for many of the UN's 2030 Sustainable Development Goals.

This observed recent progress in financial inclusion is driven by policies and initiatives that leverage digital solutions and allow for the proliferation of a new generation of financial services accessible via mobile phones and the internet. This has contributed to unprecedented levels of financial inclusion driven by mobile-based solutions (e.g., increasing account ownership). Brazil's former President Lula's *Bolsa Família* program reached one-third of the country's population, and provided financial assistance via digital payments into a card or bank account. Turning to the private sector, Vodafone's *M-Pesa* has revolutionized access to financial services since 2007, providing an entry-level e-payment platform to the Kenyan population.

Nevertheless, progress and change are far too slow. From 2014 to 2017, 300 million adults obtained a bank account[10]. While financial inclusion is on the rise in some economies, progress has been slower or has not affected segments of the population equally in others (i.e., large gaps persist between men and women). This means that there is still a vast amount of room for improvement for connecting people to formal financial services.

Why is financial inclusion still falling behind, notwithstanding the advent of mobile-based financial solutions?

Blockchain technology, or "distributed ledger technology," is a record of transactions—money, goods, or data—like a traditional ledger.

Let us look at remittances, as they are of great necessity and value for the unbanked and the underbanked. The available options for money transfers come with three related burdens: high fees, long settlement times, and low usage. For instance, the average cost to send remittances from a Money Transfer Organization (MTO) or a bank in Sub-Saharan Africa is 9.48 percent (and in some countries, it can reach up to 10 percent)[11]. The current business model of remittances is based on electronic transfers over a legacy banking infrastructure. Moreover, national payment systems in developing countries are fragmented, inefficient and lack liquidity. Therefore, money transfers cost more.

As previously mentioned, M-Pesa provided a lifeline to many people and their economy; today, two thirds of Kenyans make use of it and 25 percent of Kenya's GDP flows through it. However, M-Pesa has many downsides in its current operating model. Firstly, it is not a frictionless service. Indeed, it is still running through traditional pipelines, remaining dependent on the banking system's intermediaries and the related costs and fees. Secondly, Safaricom's agents deal with large amounts of cash daily, which makes the whole business model cumbersome and dangerous. Finally, importing funds into the M-Pesa system from overseas is not borderless and far from being instant.

The case for blockchain

The aforementioned limitations open a window to develop solutions tailored to the needs and social and cultural patterns of the unbanked and the underbanked. Developing countries and financial institutions that act now to increase financial inclusion through a supportive infrastructure are going to be in the right position to thrive in years to come. Blockchain stands tall and can be an accelerator for financial inclusion.

Blockchain technology, or "distributed ledger technology," is a record of transactions—money, goods, or data—like a traditional ledger. In today's world, a central authority such as a government or a credit card clearinghouse, usually

4 The World Bank, 2018
5 First Data, 2018
6 The International Finance Corporation, 2018
7 The World Bank, 2018
8 The International Finance Corporation, 2018
9 The World Bank, 2018
10 The World Bank, 2017
11 The World Bank, 2018

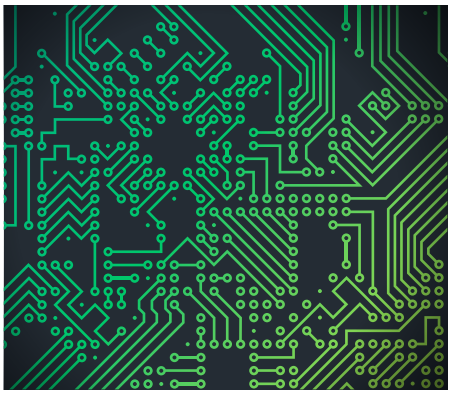
verifies transactions. Blockchain replaces the need for a centralized system, as verification of transactions comes from the consensus of multiple users. Matching the openness of the internet with the security of cryptography, the disruptiveness of blockchain brings in potential opportunities for the global payment landscape to be more transparent, efficient, and frictionless. Blockchain has the potential to provide everyone with a faster and safer way to verify information and foster trust[12]. Let us explore how blockchain technology can drive financial inclusion.

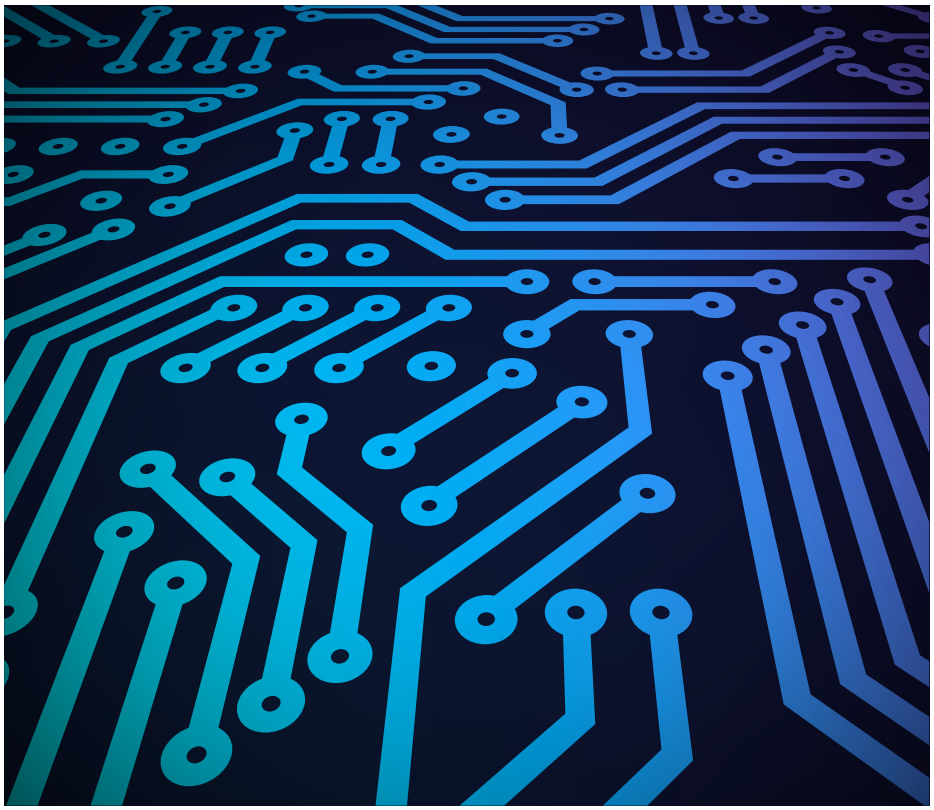
1. Blockchain addresses the high fees issue

Processing payments via national payment systems is often expensive and time-consuming. If fully adopted, blockchain can enable near-real time and accurate payments, thus reducing transaction processing costs. As highlighted before, blockchain can remove the costs and fees associated with clearing houses, credit and debit card providers, and banks, thus removing the need for all of the aforementioned third-party intermediaries. Moreover, blockchain-powered virtual currencies would allow the unbanked and underbanked to send payments globally, constituting universal means of exchange. This frees individuals from paying currency fees while transferring money to different countries. Remittance users would not incur inter-exchange spreads, as the sender and the receiver will be able to agree to transact the same virtual currency[13].

2. Blockchain facilitates the account opening process

Globally, 2.4 billion people do not have a digital identity, and this is one of the main issues preventing their access to financial institutions[14]. Working with identity solutions tools, blockchain can assist in creating a decentralized approach to identity management, and manage social and financial entitlements. For example, startup Humaniq's blockchain-based Ethereum app creates profiles based on biometric data, i.e., facial and voice recognition. Potential users are not required to have a passport or an email account. Individuals can use a smartphone to take a photo of themselves and record a video in which they make different facial expressions. Moreover, blockchain-powered solutions could help detect and prevent illegal behavior and





12 Goldman Sachs, 2017
13 The Irish Department of Finance, 2018
14 The World Bank, 2018

activities, thereby enhancing Know Your Customer (KYC) efforts and reducing the burden of time and costs associated with gathering personal information—a typically painful process for traditional financial institutions. Indeed, the immutability and transparency of blockchain could enable the creation and secure storing of clean and up-to-date customer data, leading to greater operational efficiency, increased trust, and a reduction of labor-intensive data gathering. Low cost transfers facilitated through blockchain can also be an incentive for account opening and can overcome the geographic challenges facing the unbanked and underbanked. In light of mobile phones' high penetration levels, low and middle-income individuals will be able to open an account on their phone, and in so doing avoid the costs of traveling to a bank's branch.

3. Blockchain reinforces trust

The Economist has defined blockchain as the machine for building trust. The real promise of blockchain technology is its clear and trustworthy value proposition, which fits the social and cultural practices of the unbanked and the underbanked. There is indeed no single authority controlling the ledger; the only rules are dictated by a "consensus protocol"—a mathematical algorithm that requires a majority of other computers on the network to agree on changes. This decentralized network, which relies on the collaboration of its participants, is somewhat reminiscent of the cooperative and consensual networks familiar to individuals from developing countries. Let us look at some concrete examples:

CASE STUDY 1

How cryptocurrencies are helping Filipinos to cut remittance costs and fees

The Philippines have gained the reputation as the Southeast Asian country with the largest number of overseas migrants. The Philippines is among the top five countries to receive remittances from overseas (US$32.8 billion)[15]. Coins.ph converts remittances into cryptocurrencies such as Bitcoin or Ethereum prior to being sent to the receiver, who can then withdraw it as fiat currency. In this way, the need for intermediaries or third parties is removed.

The remittance business in the Philippines, through blockchain-powered cryptocurrencies, has reduced the costs and decreased the settlement times of remittance transfers worldwide. This process, in addition to lowering transaction costs, allows customers on both ends to continue to leverage the institutions they are used to. In 2018, Coins.ph celebrated a major milestone of serving five million customers since it was founded in 2014.

CASE STUDY 2

Tunisia's national postal service leverages blockchain for national payment platform

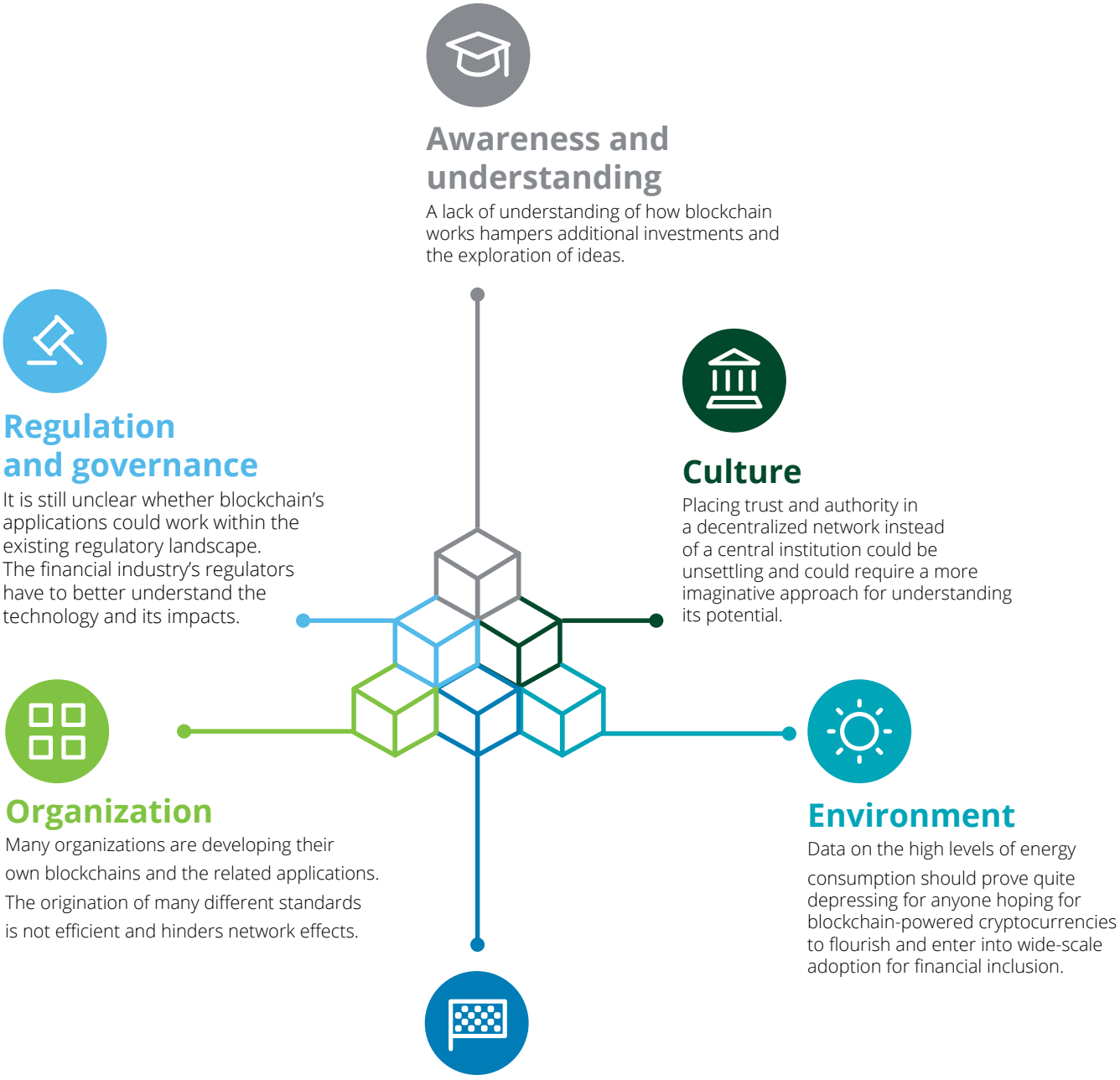
Tunisia's national post service provider, in collaboration with startups Monetas and DigitUS, has launched a pilot for a smartphone app based on cryptocurrencies originating a new national payment infrastructure. The app, which runs on Monetas' crypto-transaction platform, will enhance money transfers and remittances. Moreover, it will allow Tunisians to pay their bills and manage their government ID documents.

Despite the illustrated potential for financial inclusion, distributed ledgers are a new technology, which implies new risks and possible negative externalities, as suggested by the following non-exhaustive list.

15 The World Bank, 2017

Key challenges in blockchain infrastructure

The extent to which blockchain technology realizes its potential for financial inclusion will substantially depend on how well stakeholders steward its development. The continuously developing blockchain ecosystem is facing numerous key challenges:



Awareness and understanding

A lack of understanding of how blockchain works hampers additional investments and the exploration of ideas.

Regulation and governance

It is still unclear whether blockchain's applications could work within the existing regulatory landscape. The financial industry's regulators have to better understand the technology and its impacts.

Culture

Placing trust and authority in a decentralized network instead of a central institution could be unsettling and could require a more imaginative approach for understanding its potential.

Organization

Many organizations are developing their own blockchains and the related applications. The origination of many different standards is not efficient and hinders network effects.

Environment

Data on the high levels of energy consumption should prove quite depressing for anyone hoping for blockchain-powered cryptocurrencies to flourish and enter into wide-scale adoption for financial inclusion.

Scalability

It will take some time to get its scope of use right and to integrate it into existing infrastructures to shift the curve to broad adoption. Before being widely adopted, blockchain technology will need proof of concept.

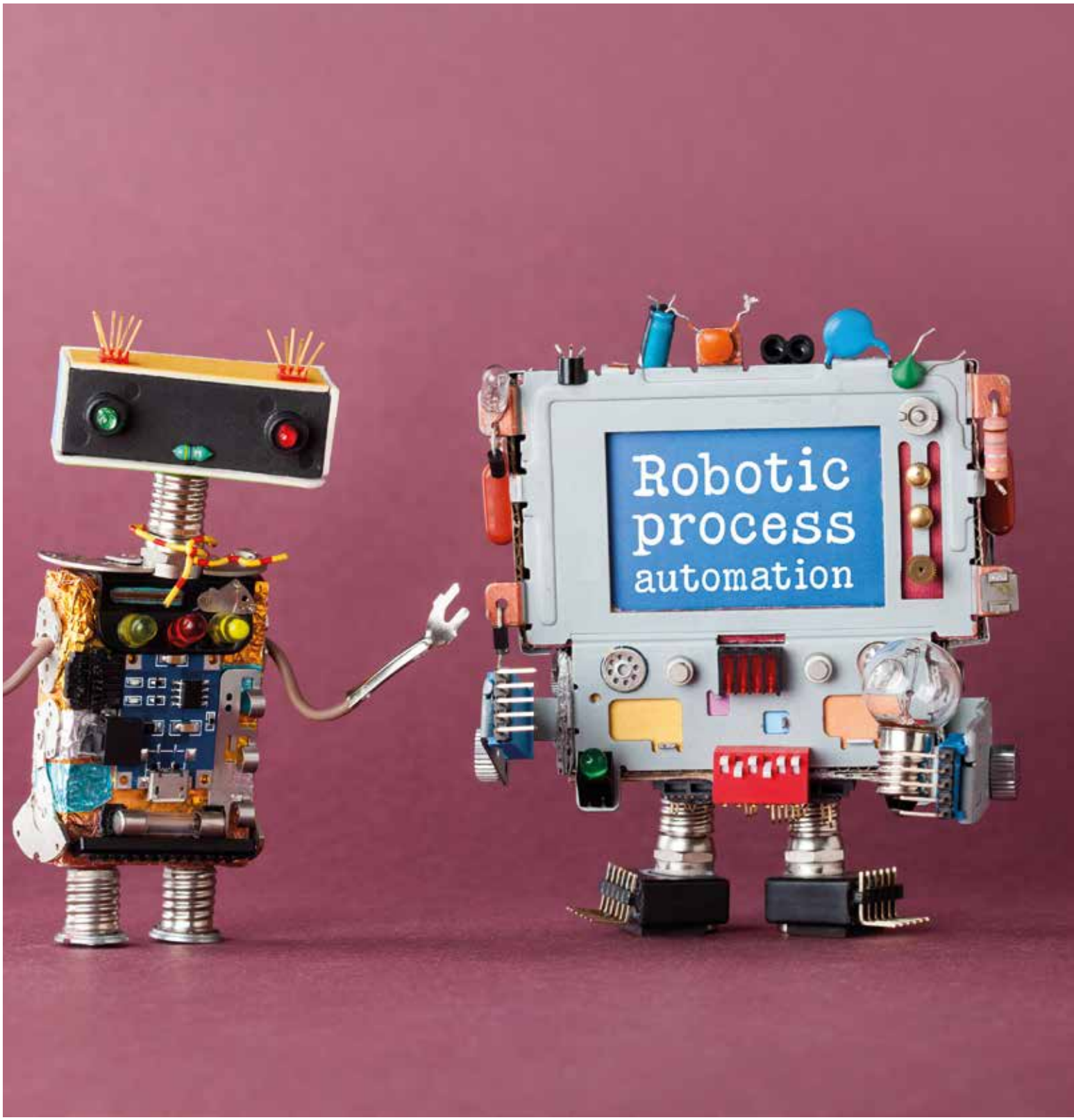
Source: https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/Innovation/deloitte-uk-blockchain-key-challenges.pdf

Conclusion

Given the value of global remittance flows (US$466 billion in 2017[16]), the remittance business creates fruitful opportunities for the design of appropriate, affordable, and convenient financial products that could enable unbanked and underbanked individuals to send or receive remittances. It is estimated that the major participants and players of the payment industry could generate incremental annual revenues of US$200 billion if they targeted financially excluded individuals and MSMEs in 60 developing countries[17].

Blockchain technology can play a pivotal role when it comes to boosting financial inclusion toward the unbanked and underbanked, and there are significant opportunities on the horizon. However, the use of blockchain technology is still at an early stage, as there are serious challenges to its widespread adoption. In light of the importance of financial inclusion and the complex nature of the obstacles described, collective action from private sectors and government is required to provide innovative solutions within a sustainable and supportive ecosystem. Blockchain is not the sole answer, but it can be a game changer by accelerating and boosting financial inclusion.

16 The World Bank, 2017
17 The World Bank, 2018


Robotic
process
automation

From robotic to cognitive automation

Benjamin Collette
Partner
Strategy Regulatory
& Corporate Finance
Deloitte

Bernard Lecaillon
Director
Operations Excellence
& Human Capital
Deloitte

Andrej Hocevar
Consultant
Operations Excellence
& Human Capital
Deloitte

Currently, organizations are competing in an environment where innovations and customer expectations are growing at an accelerated rate. In this rapidly changing environment, CIOs must address emerging challenges and opportunities. In this sense, our last Deloitte RPA survey confirmed that automation is among the top priorities for CEOs and CIOs. The main benefits sought by executives from automation are the freeing up of resources for critical initiatives, the rapid streamlining of processes and the creation of a competitive pricing advantage.

Many organizations have embarked on their automation journey by introducing robotic process automation (RPA) as a successful practice to automate some of their processes. Now the challenge is to expand the scope for automation-suitable processes to move further toward operationally optimized and agile institutions. One of the most disruptive innovations emerging on the market is cognitive solutions.

The objective of this article is to explain the shift from a well-established and relatively widely adopted robotic process automation solution toward introducing cognitive solutions.
We will explore the various cognitive automation adoption strategies based on their current RPA capabilities.

RPA has proven its efficiency by successfully automating processes with structured data, standardized sources, clear rules, and repetitive and high-volume tasks.

RPA

Using robots to automate processes is considered across various industries to be one of the main optimization enablers. This is especially the case when automating repeatable, manual, rules-based tasks across the entity. Known as a relatively simple and inexpensive software-based technology that sits on top of other applications, RPA requires no special hardware, and works well in almost any IT environment.

Companies that have implemented RPA observe an increase in their operational capacity, efficiency, and a strong rise in quality by deploying such a "virtual workforce." Some commonly perceived advantages are:

- Increased speed of processes
- Improved quality of process outputs
- Ability to operate 24/7
- Ability to free up resources for added-value tasks
- Audit trail of the tasks performed
- Processes can be automated and scaled quickly

These benefits combined with a fast speed of implementation provide an attractive short-term solution for companies. This explains why numerous organizations across various sectors have already embraced RPA: from the financial and insurance sectors to supply chain and healthcare.

RPA has proven its efficiency by successfully automating processes with structured data, standardized sources, clear rules, and repetitive and high-volume tasks. However, the appetite for automation leads the early adopters or skeptics to look beyond RPA: "What are the automation solutions I can work with for more complex processes? How can we handle unstructured data or less standardized flows?" They naturally arrive at the next step on the automation journey: cognitive solutions. Cognitive Automation (CA) should be seen as a way to further expand your scope of automation capabilities.

Cognitive automation

Cognitive automation is often described as technology trying to mimic human decision processes. The solutions use machine learning as an underlying technology to perform decision-making processes that humans face during their work. Cognitive technologies can be divided into three categories[1]:

- Cognitive language technologies (natural language processing and generation, semantic computing, speech recognition, speech synthesis, and sentiment and text analytics)
- Cognitive machine learning (supervised and unsupervised learning, and deep learning)
- Cognitive–computer vision (image recognition, OCR, video analysis, voice recognition, and handwriting recognition)

Today, cognitive capabilities are either offered as standalone solutions (by various startups, such as FinTechs) or as a solution enhancement in robotic process automation.

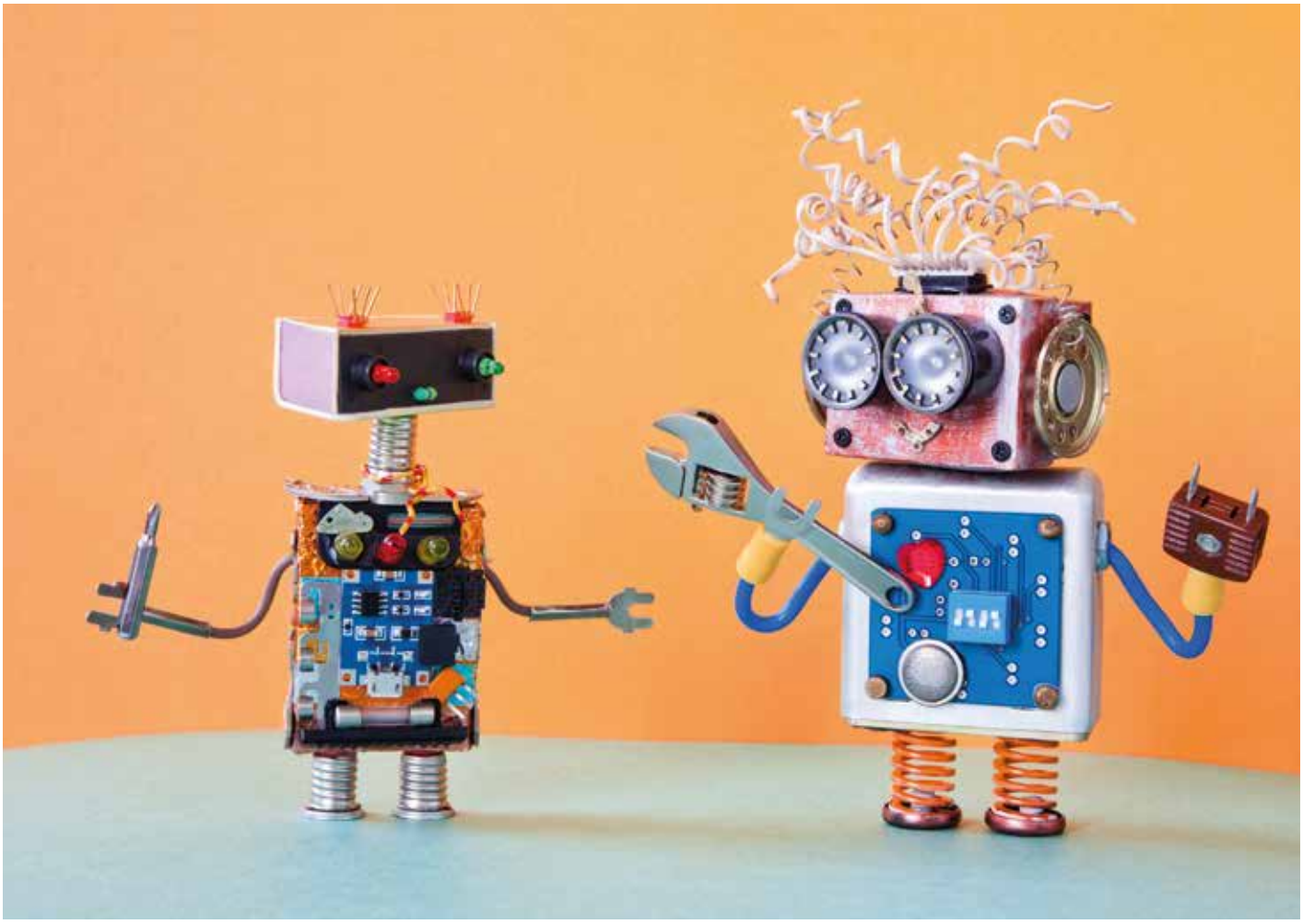
Cognitive as a standalone solution

Various companies recognize the vast potential of the impact cognitive will have on businesses. Most technological innovation leaders such as Google and IBM—with their respective products Google DeepMind (open source platform) and IBM Watson—are challenged today by numerous specialized startups (e.g., Narrative Sciences, IPSoft, Feedazi, Arria, Kira, Chatterboxlabs, and Cortical.io).

Natural language processing technology is dominating among solutions, and accounts for over 40 percent of the overall volume due to the surge in demand for pattern recognition.[2] NLP is an area of cognitive

1 "Demystifying artificial intelligence," David Schatsky, Craig Muraskin, and Ragu Gurumurthy, Deloitte University Press, 4 November 2014, "AI-augmented human services," Tiffany Dovey Fishman, William D. Eggers and Pankaj Kishnani, Deloitte University Press, 18 October 2017, and Deloitte analysis

2 "Cognitive Computing Market Size To Reach USD 49.36 Billion By 2025," Grand View Research, March 2018, https://www.grandviewresearch.com/press-release/global-cognitive-computing-market

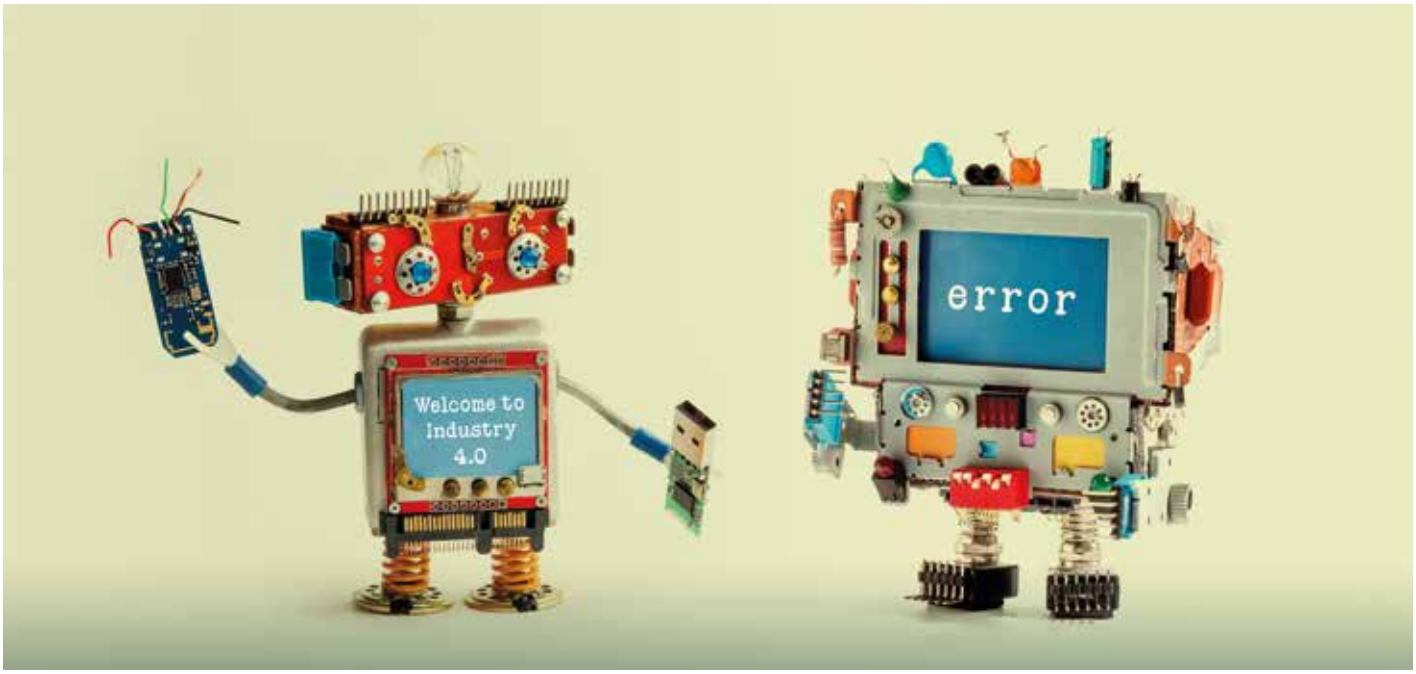


or artificial intelligence concerned with the interactions between computers and humans. There are various solutions that deviate from natural language processing, with the common underlying idea of processing and analyzing natural language data. Solutions involve speech recognition, natural language understanding, and natural language generation, among others. One of the widely offered NLP solutions is Natural Language Generation (NLG). It converts information from computer databases or semantic searches into readable human language; in its simplest form, NLG turns structured data into text. Although NLG is mainly capable of dealing only with structured data, many NLP solutions operate in conjunction with other cognitive capabilities, such as computer vision to enable the processing of unstructured data. The capabilities of these solutions include converting content to images, OCR (converting images to text), proprietary algorithms, syntax (the study of the structural relationships between words), semantics (the study of meaning), pragmatics (the study of how language is used to accomplish goals), and others.

Examples of use cases in business vary from extracting information from contracts, classifying covenants and clauses, identifying areas of change in standard contracts, automating ingestions and transforming data from any source to standardized formats, and providing support at client onboarding (e.g., performing AML/KYC analysis using a range of documentation, and improving accuracy in predicting fraud by scoring risk). Solutions based on the variety of cognitive technologies (NLP, computer vision, etc.) allow the scope of the mentioned processes to be further enlarged by enabling the processing of unstructured data as an input[3].

Another example of where NLP introduces a range of opportunities is chatbots, as companies are able to "train" them in various interactions. "Training" usually consists of providing examples of various scenarios that the chatbot will encounter. Providing more samples to the chatbot allow it to interpret and answer questions and commands on a wider basis.

3 "Unstructured data extraction via natural language processing (NLP), Alex Wu, SAGENCE, 2014, https://sagenceconsulting.com/wp-content/uploads/2017/05/INFORMS_2014_Alex_Wu_NLP_Presentation_20140904_FINAL.pdf



The elimination of manual tasks reducing the effort required to complete periodic reviews and refresh including audit trails on data changes is the main benefit brought by RCA implementation.

Cognitive automation and RPA

Cognitive automation consists in offering technological intelligence for information-intensive, decision-ambiguous processes. Integrating cognitive features with RPA (hereinafter referred to as cognitive automation or CA) helps organizations to extend the scope of processes that were previously limited to handling structured data and rules-based activities and improve the quality of the processes typically associated with RPA.

Many of the existing RPA vendors had introduced CA capabilities in their existing RPA products to enable the handling of unstructured data and decision-ambiguous processes. The most visible players expanding toward cognitive automation are:

- Automation Anywhere (offering optical character recognition—OCR)
- UiPath (enabling cognitive activities such as StanfordNLP Text Analysis, Google Text Analysis, IBM Watson NLU Text Analysis, and Microsoft Text Analysis through API keys)
- Workfusion (OCR and machine learning to deal with unstructured data)
- NICE (voice recognition, speech analytics, text analytics, and NLP) and others.

In addition to RPA functionalities, these players offer cognitive technologies that enable the treatment of wider data independently of human intervention. The combination of automated solutions and cognitive capabilities (CA) provides further benefits, such as a wider scope of process candidates, higher cost savings, overall business quality, greater operational scalability, reduced turnaround, and lower error rates. All of these have a positive impact on business flexibility and employee efficiency. Examples of activities widely automated by CA include payment error alerts handling and KYC[4].

One of the aforementioned vendors of cognitive capabilities is a US-based FSI entity that benefited from its solution to reduce manual efforts to identify false-positive alerts for non-STP (straight through processing) payment errors. The solution incorporated cognitive capabilities, such as OCR, machine learning, geocoding, and information extraction to cover 95 percent of the false-positive alerts and to deliver payments without delay.

4 "Robotic and Cognitive Automation," Deloitte Consulting, May 2018, sg-fsi-seminar-2017-robotic-cognitive-automation.pdf

They estimate savings of 55-65 percent in the first year and an automation rate of 70-80 percent.

As part of KYC, Periodic Review (PR), and Client Refresh (CR), the investigating analyst must identify missing client information and manually update various systems upon receiving it. This process takes around 25 minutes per client. The automation enabled logging in, searching for the customer record, identifying missing data, emailing the relationship manager, and then subsequently updating the information received. The elimination of manual tasks reducing the effort required to complete periodic reviews and refresh including audit trails on data changes is the main benefit brought by RCA implementation.

Other examples in FSI benefiting from RCA include AML, invoice payments, trade finance, and sanction screening.

Introducing cognitive solutions to your organization

Most organizations are already in the midst of their digital and automation transformations and can therefore benefit even further by putting cognitive solutions on the top of their agendas. We have observed different strategies for introducing cognitive technologies. From a high-level perspective, we can differentiate between companies that have already implemented RPA and companies without RPA capabilities.

Among the companies already using an RPA solution, we can divide them further based on their vendor selection: RPA vendors with CA capabilities or RPA-only vendors.

RPA vendors offering cognitive capabilities enable their clients to extend the scope of automation with newly offered cognitive features. As such, the company partnering with these vendors has already addressed its requirement for cognitive capabilities.

In parallel, the remaining RPA vendors have only recently started to join the trend and currently do not offer impactful cognitive capabilities in their automation features.

Nevertheless, companies that have embraced the latter do not necessarily lag behind. Rather than changing their RPA vendor for one with CA capabilities, they can add cognitive solutions provided by various startups and include them in the process they are automating with RPA. As an illustration, Deloitte has developed a solution for an asset management company that used the cognitive capabilities of IBM Watson and Tensor flow and merged it with BluePrism (RPA vendor). The solution automated the identification and extraction of key information (unstructured data) from multiple sources such as annual reports, scientific literature, financial statements, contracts, internal repositories, and databases. Whereas IBM Watson's technology served to collect unstructured data from multiple sources and transform it into structured data, BluePrism was used as a glue to connect all the related rule-based activities in the respective process. Automation (previously done manually) resulted in time being reduced from seven days (elapsed) down to three minutes, and 95 percent accuracy.

Organizations that have not operated with RPA yet can catch up to their competitors by accelerating their optimization programs in two ways:

- Organizations can leverage their (latecomer) positions by automating their processes through the selection of an RPA/CA vendor.
- Organizations do not necessarily need RPA but could benefit from cognitive capabilities. In this scenario, organizations can directly apply cognitive solutions (from startups or other companies specialized in cognitive technologies) to automate a specific process, and benefit from new business intelligence.

Depending on the needs and current adoption of various automation tools, organizations need to assess and align their existing capabilities (automation and cognitive), automation needs, processes, and business objectives to define the best strategy to meet their optimization and efficiency goals.

Conclusion

Until recently, RPA offered a new way to automate simple processes quickly, relatively inexpensively (compared with other solutions), and with many benefits. Nevertheless, technological advances in the fields of cognitive and artificial intelligence are enabling further development and the optimization of processes with greater complexity. Regardless of the current level of automation, companies have the same opportunities to move toward becoming operationally lean organizations, with the only difference being the choice of strategy.

The automation journey, beginning with RPA and advancing toward cognitive automation should be seen as an entity's path toward the future of operations. We are observing technological advancements that lead toward AI. Considering this, companies need to familiarize themselves with and adapt to innovations such as cognitive automation to be prepared for the next step: AI.

Traditional PMS software strategies to face the rise of robo-advisory solutions

Patrick Laurent
Partner
Technology & Enterprise Application
Deloitte

Steve Hauman
Partner
Technology & Enterprise Application
Deloitte

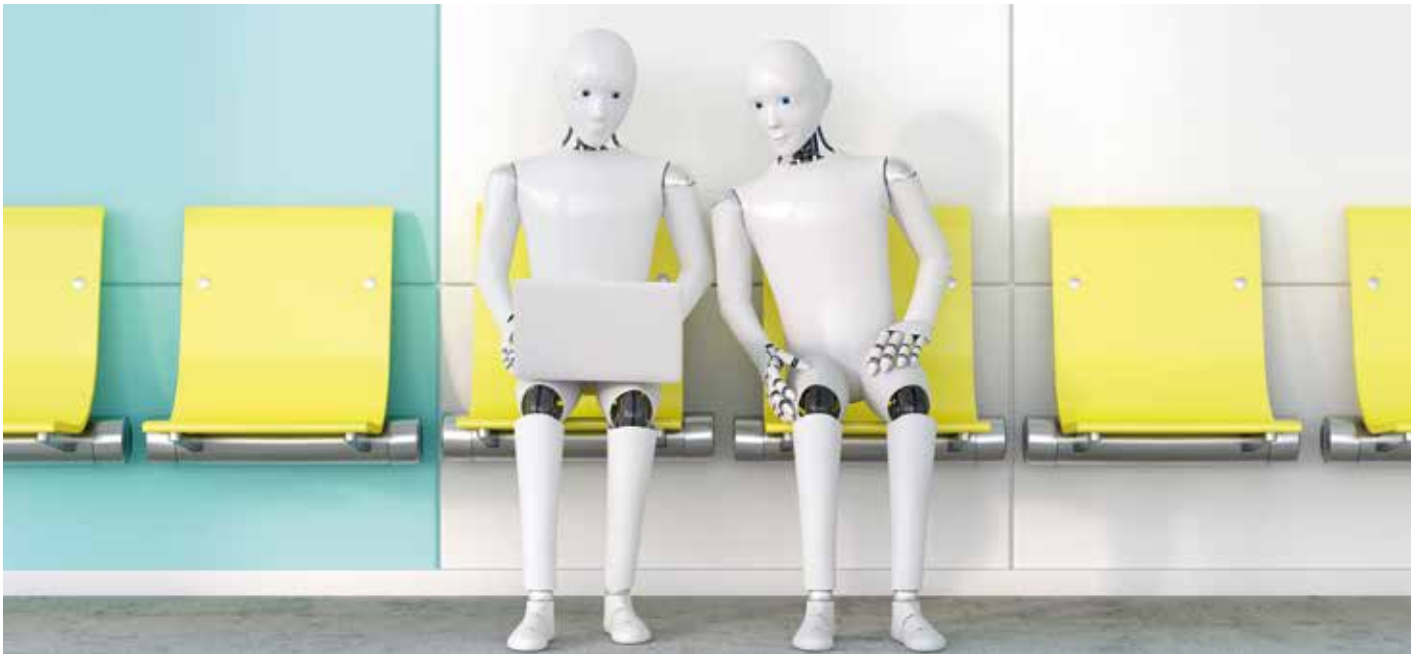
Julien Schaffner
Director
Operations Excellence & Human Capital
Deloitte

Arnaud Dehaine
Senior Consultant
Operations Excellence & Human Capital
Deloitte

Robo-advisory solutions represent the fastest growing category of actors within the wealth management industry. Their growth potential suggests these digital offerings could meet customer expectations.

While the wealth management industry is still suffering from a low-rate macroeconomic environment, competition increases. More stringent regulations, like MiFID II in Europe, also make it more expensive to ensure compliance. Traditional actors are under pressure to reshape their wealth management and advisory services by integrating these as digital services into their standard offering.

What is the current state of Portfolio Management System (PMS) offerings in Europe? How are software vendor strategies influenced by digital transformation, and especially by the emergence of numerous robo-advisory solutions?



In the turmoil of digital transformation across all industries, the CIOs of European Wealth Managers might ask themselves what the next best digital step is for them regarding the evolution of their portfolio management and advisory systems. In order to understand how traditional PMS providers have reacted to the numerous launches of robo-advisory solutions, we first describe the current robo-advisory model and the current market situation, and give an overview of the European market. We then discuss the current offering of PMS solutions and evaluate their digital mat urity compared with the robo-advisory service offerings. Finally, we provide a view on the key evolutions identified for existing PMS solutions and interpret these into potential strategies for software vendors and options for CIOs of Wealth Managers.

Current robo-advisory model and market overview

A robo-adviser is an online solution offering automated investment guidance and portfolio management capabilities at a limited cost. It can cover different parts of the wealth advisory value chain; however, none can cover all.

- **Modern Portfolio Theory (MPT) at the core.** These digital solutions extensively use algorithms based on mean-variance optimization, rooted in traditional MPT. Coupled with online customer profiling, they offer a reasonably customized investment allocation strategy.
- **Mostly based on ETF** investment products (over 80 percent of sample panel robo-advisory solutions analyzed[1]) to minimize costs, robo-advisory solutions ease processing (ETF products are liquid and easily tradable) and maximize underlying diversification. Some solutions also provide access to stocks, bonds, commodities, and currencies (25 percent offer more than three asset classes[1]). Limiting fees is their main selling point in a continued low-rate economic environment and also represents a component of investment performance.
- **Robo-advisory solutions target millennials.** These online investors are tech-friendly and financially savvy self-investors who are generally early adopters of these "gamified" automated investment solutions. Less wealthy investors benefit from low entry

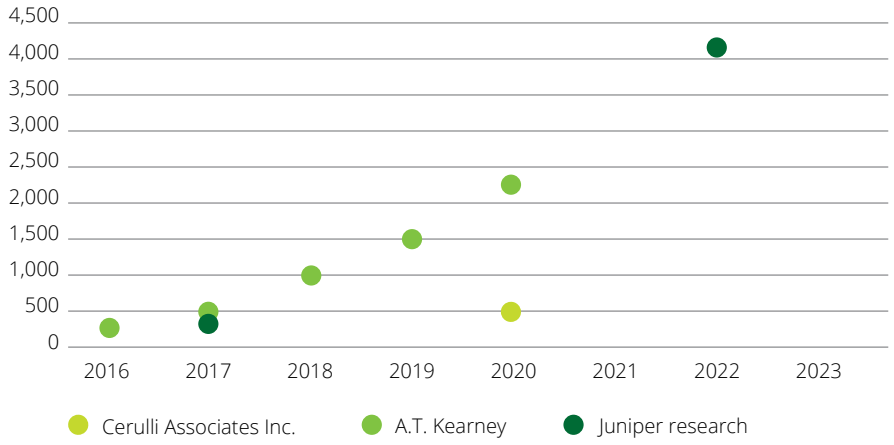
1 Based on Deloitte panel research and analysis of 16 leading European robo-advisory solutions and their available offerings

thresholds, which are very attractive to the Mass Affluent market (wealth below US$1 million). This market represents 39.7 percent of the total global wealth (vs. 45.9 percent for HNWI according to a Credit Suisse study[2]). However, the target of robo-advisory solutions is broader; personalized investment advice in wealth management remains human-based and expensive. A digital robo-advisory offering is an opportunity to capture younger millennial clients with efficient and inexpensive rule-based investment solutions. It represents a potential starting point in the relationship to capture millennial clients, a generation that is expected to receive the biggest inheritance to date (estimated at around US$3.9 trillion by 2026[3]). A robo-advisory offering can also help to streamline and enforce strict advisory processes, in line with applicable regulations.

- **An investment that matters.** Younger investors also consider ethical or socially responsible investments a major concern in decision-making. Motif Investing[4] in the United States and Investify[5] in Germany and Luxembourg have launched thematic investments to enable investing based on personal preferences and beliefs.

Tremendous growth and potential.
The robo-advisory global market is still growing at a fast pace; a recent study by Juniper research estimates that "total assets under management (AuM) by robo-advisers will rise twelvefold, from US$330 billion in 2017 to US$4.1 trillion in 2022"[6]—still higher than previous estimates (see Figure 1). Revenue forecasts for robo-advisory platforms are also expected to reach US$25 billion by 2022, according to the same study[6].

Figure 1: Projections of AuM by robo-advisers[6,7,8]
(in billion US$)



Nevertheless, very few robo-advisory solutions are reaching significant market share. The global market is led by US hybrid advisory solutions launched by Vanguard, Charles Schwab, and TD Ameritrade[9], which have limited penetration in Europe. These leading US asset managers have answered the robo wave through corporate robo-advisory solutions combined with human advice. Vanguard's Personal Advisor Services is the first digital advisory platform to reach the milestone of US$100 billion in AuM[10].

This top mark of AuM bears no comparison with original robo-advisory disruptors Betterment (~ US$11 billion) and Wealthfront (~ US$8.2 billion)[9], which have been significantly outrun in AuM, even though their investment entry thresholds (from $0) are much lower than those for the leading US asset managers' solutions (up to US$100,000).

2 Credit Suisse Global Wealth Report 2017
3 WealthX, retrieved from https://www.wealthx.com/report/preparing-for-tomorrow-a-report-on-family-wealth-transfers/
4 https://www.motifinvesting.com/
5 https://investify.com/app/portal/home
6 "Fintech Futures: Market Disruption, Leading Innovators & Emerging Opportunities 2017-2022," Juniper Research, featured by Fintech Innovation, retrieved from https://www.enterpriseinnovation.net/article/expect-revenue-robo-advisory-platforms-reach-us25-billion-2022-50574272
7 "2,500 percent asset growth projected for robo-advice platforms," based on Cerulli Associates Inc. research, published by Investment News, 4 November 2015.
8 A.T. Kearney 2015 Robo-Advisory Services Study, retrieved from https://www.atkearney.com/documents/10192/7132014/Hype+vs.+Reality_The+Coming+Waves+of+Robo+Adoption.pdf/9667a470-7ce9-4659-a104-375e4144421d)
9 TechFluence, retrieved from https://www.techfluence.eu/investtech.html
10 FinancialPlanning, 01/05/2018, retrieved from https://www.financial-planning.com/news/vanguard-digital-advice-platform-hits-100-billion

While numerous robo-advisory solutions are providing digital-enabled customer experience, their actual reach in pure investment advisory may appear quite limited.

The European market of robo-advisory solutions is lagging behind with 98 players according to TechFluence and only €2.5 billion of AuM in November 2017[9]. European markets still appear dependent on country-specific legislation and few FinTechs have reached critical size. UK-based Nutmeg is the only robo-advisory solution in Europe with an estimated AuM above €1 billion[9]. The German solution Scalable Capital ranks second with an estimated AuM of €600 million, and the Italian company Moneyfarm is third with estimated AuM of €375 million[9].

The largest European markets are Germany and the United Kingdom (UK). According to TechFluence, there are already 41 robo-advisory offerings in the German market (excluding white-label offerings) and further partnerships with financial institutions are expected to deploy B2B(2C) solutions. The UK market appears heavily driven by pension-specific regulations with numerous robo-advisory offerings dedicated to pensions.

Robo-advisory solutions in Europe are also subject to the MiFID II regulation. The European Securities and Markets Authority (ESMA) has confirmed firms operating robo-advisory solutions must perform a complete suitability assessment and potentially adapt online questionnaires to ensure compliance. They must also explain the exact degree and extent of human involvement and clearly inform the investor on the role of the online questionnaire and sources used to provide investment and portfolio management services.

Large banks have already taken some action to accelerate their digital transformation and respond to the development of robo-advice. In 2017, BNP Paribas Asset Management, for example, acquired a strategic stake[11] in the Belgian investment management company Gambit Financial Solutions (founder of robo-advisory solution Birdee). UBS Wealth Management USA is offering hybrid robo-advisory services through its

UBS Advice Advantage platform[12]. While collaborating with the US-based SigFig robo-advisor since 2016, the Swiss bank has recently closed its automated online investment service in the UK, SmartWealth, more expensive than many robo-advisory solutions but also offering a mix of active and passive funds[13]. Other players have decided to develop in-house solutions, like Banque et Caisse d'Epargne de l'Etat in Luxembourg with its SpeedInvest[14] digital and automated investment product. Deutsche Bank is also offering the Robin robo-advisory solution based on its private banking entity investment analysis[15].

While numerous robo-advisory solutions are providing digital-enabled customer experience, their actual reach in pure investment advisory may appear quite limited. How have incumbent PMS vendors reacted to this market trend and how are they supporting banks to include similar digital features in their offerings?

Digital maturity of traditional PMS solutions compared with the robo-advisory value chain

In 2018, Deloitte conducted a non-exhaustive study of more than 20 PMS solutions covering wealth management and fund management capabilities for small and mid-sized actors, including both SaaS and BPO/middle-office providers. A more detailed study of seven PMS solutions with significant market presence in Europe enabled us to evaluate the current digital maturity of traditional PMS solutions against a robo-advisory value chain, regardless of whether solutions were used historically for fund management or for wealth management.

We can describe the end-to-end robo-advisory value chain as following a clear path of digitalized and often gamified activities (see Figure 2):

- Prospective clients browse an online tool and **digitally onboard** their new investment solution
- The potential clients define their **financial and risk profiles**, including knowledge and experience, through online questionnaires
- The digital investors set out the financial goal(s) they want to achieve along with initial and recurrent contributions, which results in a **goal-based investment strategy** proposition for confirmation
- The investor can digitally **monitor assets'** evolution and exposure in real-time and also generate a standard report on demand
- **Alerts** facilitate that tracking and **recommendations** aligned to preferences are pushed toward the investor to actively follow portfolio evolution
- Rebalancing of the portfolio enables **realignment with the strategy and goal(s)**; these can be turned into investment proposals pushed to the investor prior to automated ordering

11 https://www.bankingtech.com/2017/09/gambit-acquisition-offers-bnp-paribas-robo-advisory-opening/
12 http://www.investmentnews.com/article/20180406/FREE/180409951/ubs-giving-sigfig-powered-robo-to-certain-clients
13 https://www.ft.com/content/21bec7e6-aba4-11e8-89a1-e5de165fa619?desktop=true&segmentId=7c8f09b9-9b61-4fbb-9430-9208a9e233c8#myft:%E2%80%A6
14 http://paperjam.lu/news/les-robots-dans-la-place
15 https://www.maxblue.de/robin/konzept.html?cookieTest=check

Figure 2: Robo-advisory value chain

As of today, incumbent PMS vendors have often developed functionalities and/or tools for specific client implementations. However, they rarely offer dedicated built-in modules, for example for Digital Client Engagement or Financial Planning, which tend to be part of their roadmap.

Four out of seven incumbent PMS solutions of our study currently offer goal-based investment planning[16]. Only a minority of traditional PMS vendors—two out of seven PMS solutions in our detailed study—can provide an end-to-end robo-advisory capability[17]. In the course of our study, we found that even a market leader in core banking solutions had only scheduled to deliver an end-to-end robo-advisory solution at the end of 2018.

Such limitation in the possibility of offering digitalized customer experience should be compared with the customers' expectations to consume services anytime, anywhere. Surveys indicate that many investors expect to conduct the majority of their investment activities digitally in a few years' time, and 51.3 percent of HNWIs consider hybrid advice of high importance for the ongoing management of their wealth[17]. The key question is whether PMS vendors can lower the attrition rate of wealthy investors and attract younger generations of investors, while automated investment solutions provide digital investor experience for a limited cost.

Key results and impacts on existing PMS solutions

Traditional PMS solutions differentiate from robo-advisory solutions through the breadth of wealth management capabilities available, but also from a technical and architectural perspective.

Wider functional reach. Aside from the robo-advisory value chain, traditional PMS softwares differentiate through their wider coverage of investment products and functionalities:

- Investment products include funds and standard investment securities accessible as direct lines in a portfolio, but also Forex, futures, or basic liquidities. Private equity investments can often be supported
- Portfolio management functionalities can be customized in terms of pricing, valuation, and exposure computation
- Various performance calculation methods can be used and some solutions offer further flexibility in including/excluding specific assets from calculations
- Portfolio managers can manage groups of clients and assets for monitoring and reporting but also to automate rebalancing
- Asset classes and allocation levels can be customized to the wealth manager's needs; strategies can also be customized to investor specificities
- Ordering provides advanced allocation rules to support the portfolio rebalancing

They also support profiling, investment strategy definition, and rebalancing, but these advanced portfolio management functionalities are mainly accessible to portfolio managers in a web interface. The proportion of PMS vendors offering at least one mobile solution as standard to end customers (mobile or tablet) amounts to six out of seven solutions[16]. These provide rather basic consultation capabilities for visualizing the evolution of invested assets and their performance.

Ongoing technical evolution. On the technology side, the vast majority of PMS vendors now offer additional cloud-based solutions aside from the traditional on-site implementation:

- Software Service Provider (SaaS): more than 90 percent of PMS vendors offer to handle maintenance on top of installation
- Hosting capabilities: about 60 percent of panel vendors studied offer the option to host infrastructure as well as the application
- As for Business Process Outsourcing (BPO), two thirds of non-BPO panel vendors also offer some type of outsourcing services to support operations or basic reconciliation tasks

Installation on premises nevertheless remains the main delivery model by far and only a few players have chosen the SaaS mode. Externalization of the infrastructure is becoming common for small-sized wealth management actors, even though the geographical location of hosting is of primary concern, especially for historical wealth management countries like Luxembourg and Switzerland. Such sensitivity to hosting location may evolve thanks to innovation and acceptance of digital encryption, especially as the regulatory framework is evolving favorably, even in wealth management offshore centers. This will facilitate the use of cloud-based solutions and favor the SaaS model, which aims to provide a ready-to-use solution to free business players from having to invest in IT services, thereby avoiding heavy maintenance and upgrade workloads. The SaaS model indeed provides the benefit of regular upgrades applied to the solution by the vendor.

Architecture requires further modernization. The current architectures available can be split among three main models:

- Traditional client—server architecture
- Service-oriented architecture
- Full API-based

Today, only two out of seven PMS solutions in our study[16] offer an open architecture model with API integration, while a third solution is in the process of developing API for their main functionality.
None of the traditional PMS vendors in our detailed study offer built-in connectors with existing core systems or innovative middle layers such as Mulesoft or Five Degrees. Operating compatibility is still often limited to a single system (Oracle, Microsoft, etc.) and only two out of seven PMS solutions enable strong data extraction capabilities[16].

While the adaptation to a digital modern architecture is still limited and strongly focused on the front-end digital layer for the time being, PMS solution providers may choose to redesign their architecture to address digital requirements from the core, which will require massive investments. Only a well-designed streaming architecture can target high-speed interconnection between micro-services.

Which strategy for PMS solution providers?

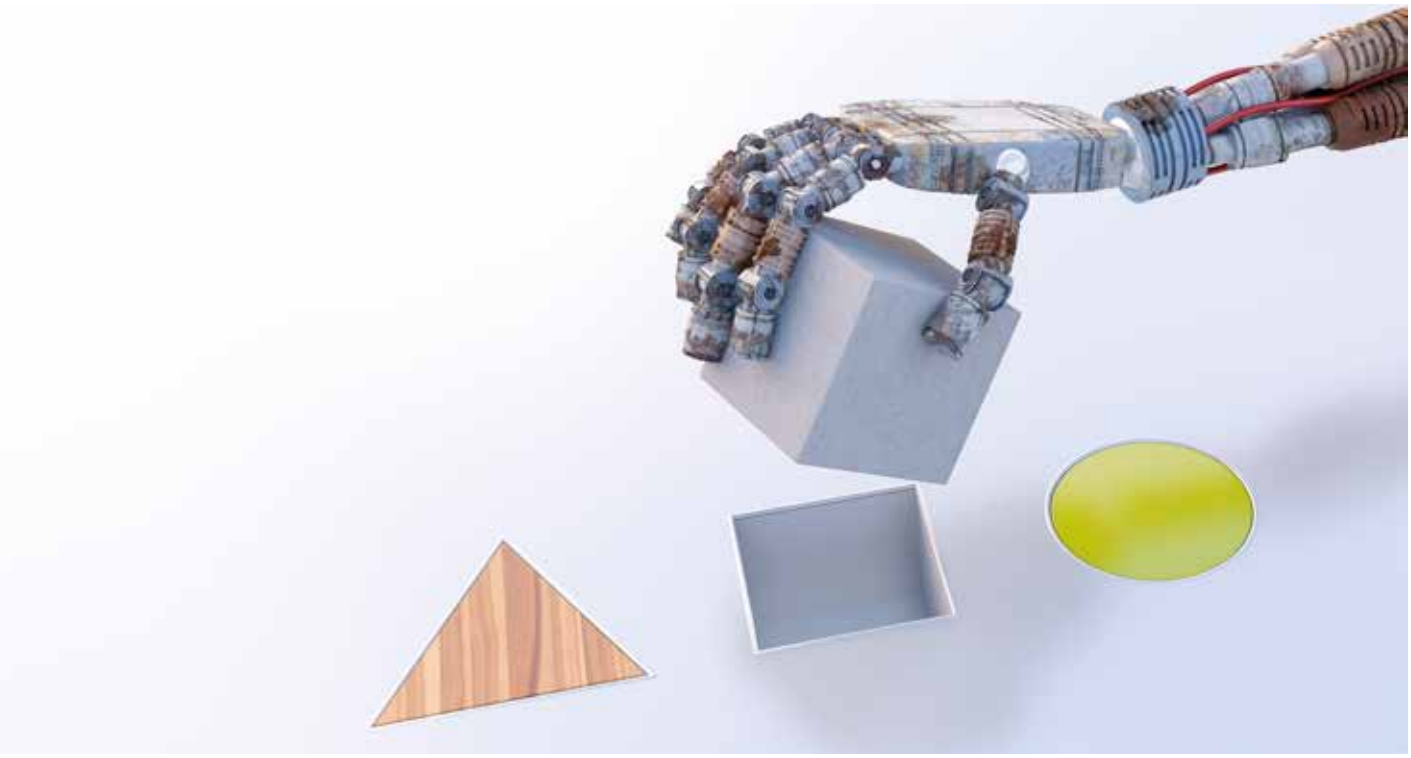
As incumbent PMS vendors still mostly lag behind in terms of digitalized services, they must opt for a strategy in order to respond to the digitalization of investment advice:

- Accelerate internal developments to launch a digital investor journey, with a user-experience comparable to that of FinTech players
- Partner with existing FinTechs to benefit from their B2B offering and white-label platform. Such a move will enable them to benefit from an existing digital experience or to cover specific capabilities. Sanostro, for example, specializes in currency hedging to reduce downside risk in portfolios thanks to selected underlying models of quantitative funds[18]
- Create a recognized marketplace that is attractive to both FinTechs and PMS software clients, targeting harmonized integration among participants. For example, a leading core banking and PMS provider already has 150 marketplace solutions, thus achieving one of the largest partner ecosystems
- Acquire a full robo-advisory player to complement the offering with a ready-to-use solution already accepted by investors

16 Based on Deloitte detailed study of seven PMS solutions with significant market presence in Europe
17 Capgemini World Wealth Report 2018
18 http://sanostro.com

Figure 3: Who will reach Digital Portfolio Management first?

Considerations should also extend to the availability of digitalized capabilities and the potential of PMS vendors to support a digital customer experience. Therefore, a digitally enabled front-end, a component-based architecture, an existing marketplace for digital solutions, or partnerships with FinTechs are differentiating strengths for future business agility.



Conclusion

When looking to move toward a more digitalized wealth capability, CIOs could think of two main solutions: either pushing their current software vendors to develop digital features more rapidly, or selecting a new PMS or robo-advisory software.
In the latter case, considerations should not be limited to the coverage of business needs. Obviously, potential options for the CIOs of wealth management companies will depend on business priorities.
The selection will also be driven by the type and size of the wealth and fund management player and whether technical and implementation knowledge can be mobilized internally.

However, considerations should also extend to the availability of digitalized capabilities and the potential of PMS vendors to support a digital customer experience. Therefore, a digitally enabled front-end, a component-based architecture, an existing marketplace for digital solutions, or partnerships with FinTechs are differentiating strengths for future business agility. Recent partnerships with FinTech solutions have resulted in the emergence of new digital solutions, like ABN AMRO's launch of Prospery, a new fully digital wealth management platform, made available in the Netherlands and Germany, in less than 18 months.

Some specialized solutions also offer dedicated tools for online onboarding, goal setting, and risk analysis. These are worth considering in order to bring new digital features to existing systems. For instance, new FinTechs provide specialized services for currency hedging to create more added value for the investor while easing the work of portfolio managers.

Finally, outsourcing opportunities should also be considered. Infrastructure outsourcing can represent a great opportunity, and will facilitate the focus on core activity for wealth management companies. Business Process Outsourcing can also free wealth manager resources from basic recurrent back-office tasks, like reconciliation and securities masterfile management, to reallocate additional workforce to services geared at adding value for end clients.

Instant Payments Overcoming challenges to win the race against time

Pascal Eber
Partner
Operations Excellence & Human Capital
Deloitte

Sebastien Genco
Director
Technology & Enterprise Application
Deloitte

Alexandre Havard
Director
Operations Excellence & Human Capital
Deloitte

Catherine Lebailly
Analyst
Operations Excellence & Human Capital
Deloitte

In a world where "faster" is everyone's favorite word, payment is no exception. With the advent of instant payment schemes in many countries, payment standards are moving toward constant availability and immediacy. Payment service providers that are lagging behind will have to hustle to find suitable solutions to implement real-time payments within their payment architecture. However, they should bear in mind that the path toward real-time payment is strewn with many technical pitfalls.


PAY

Since November 2017 and the publication of the SEPA Instant Credit Scheme (SCT Inst), payment service providers (PSPs), and especially traditional credit institutions, have been facing challenging strategic decisions regarding the future of payments. Indeed, by launching the SCT Inst, the European Payment Council (EPC) demonstrated its willingness to introduce a harmonized scheme that enables the execution and reception of instant payments in Europe[1].

From a SEPA perspective, an instant payment is a credit transfer executed within 10 seconds and is available around the clock (i.e., 24 hours a day, 365 days a year). While allowing immediate availability of funds to the beneficiary, these real-time payments are irrevocable. For the time being, and until potential future amendments are made to the SCT Inst rulebook , these immediate transactions are capped at €15,000 and are only available in euro. For consistency and ease of implementation, SCT Inst is based on the existing SEPA Credit Transfer scheme and is independent of any clearing and settlement mechanisms (CSM). Although participation in this scheme is optional, it brings a wide range of opportunities for payment service providers, since it allows real-time cross-border payments within Europe.

While the EPC initiative is quite recent, other real-time payment initiatives have already emerged through different systems and applications around the world in recent years. Japan was a front-runner in 1973, followed by Korea and Switzerland, in launching an operational fast payment system. Over the years and technical innovations, payments have become increasingly fast, inevitably culminating in instant payments. Many countries followed the trend launched by the forerunners, and currently have operational real-time payment systems, such as the New Payment Platform (NPP) in Australia, Faster Payment Service (FPS) in the UK or Nets in Denmark. The latter two initiatives are evidence of the multiplicity of domestic schemes that have emerged in Europe in the recent past. These national initiatives nonetheless have a significant drawback, since they prevent any interoperability and, unlike the SCT Inst pan-European scheme, only enable real-time payments within their borders.

These national initiatives have arisen because of the opportunities available with instant payments. Instant payments enhance customers' shopping experiences both on e-commerce platforms and at points of sale; for the former, instant payment implies instant shipping and rapid delivery. For the latter, instant payments substantially reduce checkout time. Real-time payment also constitutes a growth accelerator for the collaborative and sharing economy by boosting peer-to-peer (P2P) payments. Instant payments allow consumers to have more confidence in these P2P payments thanks to the immediate availability of funds. Consumers are not the only ones benefiting from the emergence of immediate payments; corporates also have a lot to gain. Thanks to instant payment, corporates immediately receive the payments from their clients and can instantly reuse the money for other business purposes. It allows a better management of cash flow to ensure sufficient liquidity and to keep the treasury up-to-date.

As consumers strive for immediacy and regulators seek to enhance customer experience and economic growth, instant payments will soon set the new universal standard for payments. PSPs therefore have everything to gain from being at the forefront of the payment revolution. The first movers will be able to capture significant market share and build innovative financial services while leveraging their round-the-clock infrastructure.

Institutions that decide to delay their strategic decision might run the risk of becoming irrelevant for their clients. The opportunities offered to PSPs by real-time payments come with significant challenges that must be overcome before PSPs can reap their benefits.

Dutch banking sector initiative

1. 5 seconds
2. No maximum amount (within NL)
3. Collective (Dutch banks)
4. Multiple CSMs (incl. Dutch National Bank)
5. Live in Spring 2019

Fast Payment Services

1. Few seconds
2. £250,000/transaction
3. Collective (Non-profit association owned by banks)
4. Central Bank settlement
5. 2008

BPCE Group initiative

1. 10 seconds
2. €15,000/transaction
3. Individual
4. No information
5. Live in Q4 2018

Jiffy

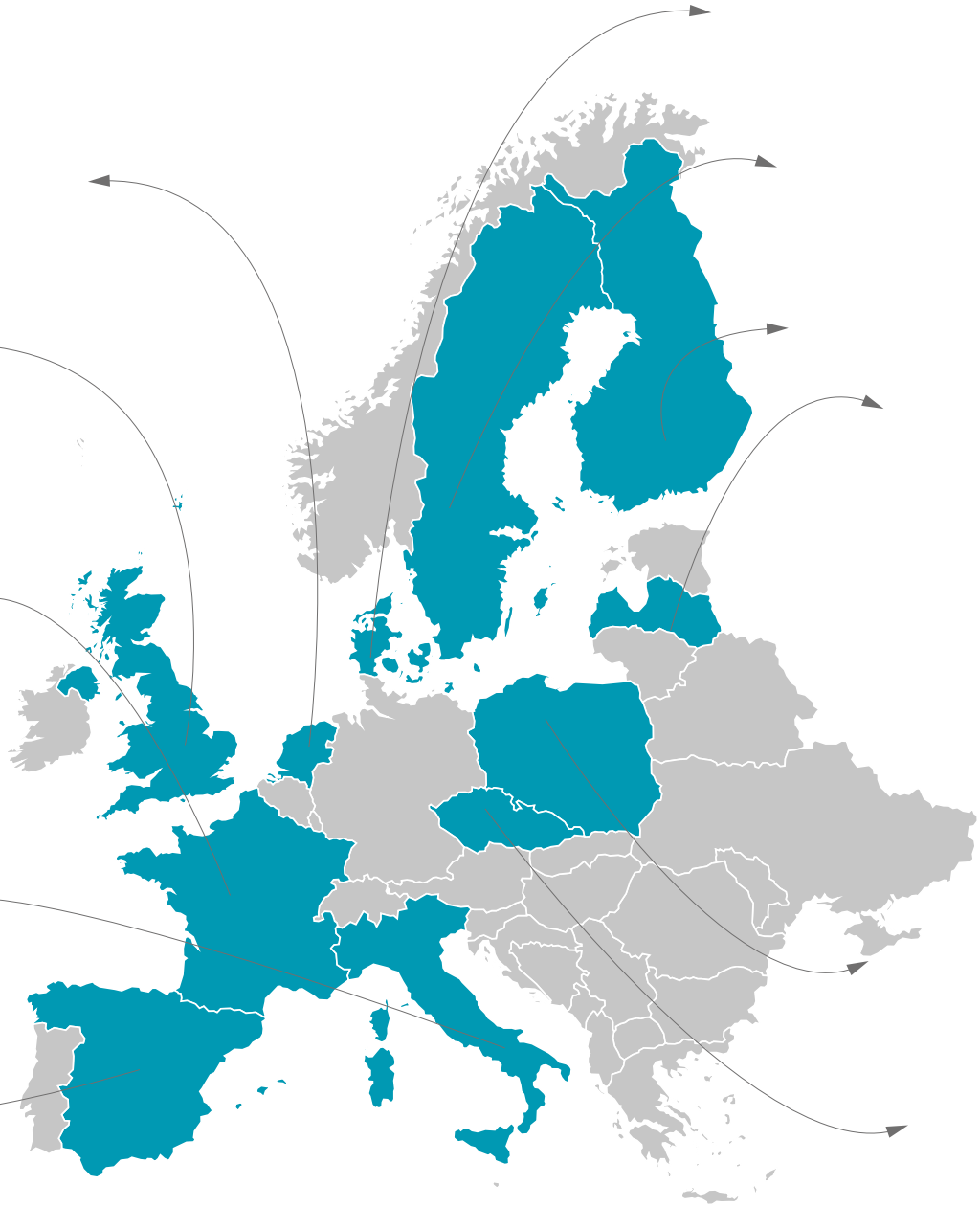
1. 2.5 seconds
2. €250/transaction and €1,500/month (i.e. defined by the banks)
3. Independent (external)
4. RT1 (EBA Clearing)
5. End of 2014

Bizum

1. 5 seconds
2. €1,000/ transaction
3. Collective (i.e. 7 Spanish banks)
4. Iberpay
5. July 2016

1 In the SEPA area (i.e., 34 countries in Europe that are members and non-members of both the Eurozone and the European Union)

1. Execution time
2. Maximum amount
3. Type of initiative
4. Clearing and Settlement Mechanism used
5. Starting Date



Nets
1. 1.5 seconds
2. DK 500,000/transaction (≈€67,000)
3. Independent (external)
4. Straksclearing system (Internal)
5. 2014

Swish
1. 1-2 seconds
2. SEK 150,000/transaction (≈€15,000)
3. Collective (7 Swedish banks and Central Bank of Sweden)
4. Bankgirot
5. May 2016

Siirto
1. 3 seconds
2. €1,700/day
3. Collective (3 Finnish banks)
4. No information
5. March 2017

ZIBMAKAJUMI
1. Few seconds
2. €150,000/transaction
3. Central Bank (SCT Inst)
4. Latvijas Banka's electronic clearing system (EKS)
5. November 2017

Elixir
1. 3 seconds
2. 100,000 PLN/ transaction (≈ €25,000)
3. Independent (external)
4. Express (Elixir Internal)
5. 2012

Raiffeisen Bank International
1. 10 seconds
2. €15,000/transaction
3. Individual
4. RT1 (EBA Clearing)
5. November 2017

Challenges

Most of the PSPs aiming to provide instant payments through the SCT Inst scheme will face one major challenge: how to handle a payment in less than 10 seconds when current payment processes run in minutes for the most efficient, and hours or days for the rest. In particular, we identified four main aspects to analyze.

Low latency

Until recently, payments were executed by completing a series of actions on a sequential basis. Payment processing used to take a few days in its entirety when cross-border and cross-currency transactions were involved. Even though the entry into force of the revised Payment Services Directive (PSD2) is decreasing the execution time to one business day for EEA-currency payments, some progress is still needed to reach the 10-second target. The process will inevitably have to be redesigned to enable the simultaneous performance of some actions. Furthermore, these actions, even if performed at the same time, will have to be carried out within a drastically shorter timeframe. In fact, the clearing and settlement of payments will take no more than one second. Some clearing and settlement mechanisms (i.e., CSM) that are fully compliant with the SCT Inst have already been established to enable the processing of these real-time payments. The European Banking Authority (EBA) launched the RT1 in November 2017 (i.e., same timing as the SCT Inst) while the European Central Bank (ECB) will complete its offer with the Target Instant Payment Settlement (TIPS) by November 2018.

Availability

Instant payments do not only need to be executed in real-time, they must also be accessible on a 24/7 basis. This implies a constant availability of payment systems to enable the initiation of payments outside regular business hours. However, many commonly used payment systems are incompatible with the execution of real-time payments, since they rely on the processing of transactions in batches. Payments are collected during the day and reconciled for processing through a batch-based system on a cycle basis. When providing instant payments, systems need to be able to submit payments to clearing services at a transaction level. Instead of processing batch files of payments at specific times of the day, PSPs must have the capability to process a large volume of individual transactions at any time.
In order to remain constantly available, PSPs' payment architecture could rely on multiple datacenters that would allow one datacenter to go down while the other(s) take(s) over processing the payment transactions. This active/active processing would require the core banking system to stay online at all times.

Liquidity management

For PSPs, one of the main day-to-day challenges is liquidity management. This challenge takes on more weight when offering instant payments. The processing of payments through a batch-based system has so far allowed PSPs to have foreseeable liquidity flows. With real-time payments, liquidity management becomes an important factor of uncertainty. Even though the challenge of striking a thoughtful balance between keeping sufficient liquidity to process incoming payment orders and not keeping useless cash that could be used to make investments remains the same, it is intensified with the provision of instant payments. Inflows and outflows occur at any time of day and are unpredictable. Therefore, liquidity has to be effectively managed on a much more frequent basis and PSPs will attempt to accurately forecast instant payment patterns.

To tackle this liquidity concern, the ECB is revising its Central Liquidity Management (CLM) by 2020 to provide a harmonized and standardized management of liquidity in the European payment framework. High-volume payments will be settled through the Real-Time Gross Settlement (RTGS), while low-value instant payments will be through TIPS. Financial institutions will be able to allocate their liquidity to each service (i.e., TIPS, RTGS and T2S) in which they hold a Dedicated Cash Account (DCA). Connectivity with the various clearing and settlement mechanisms (e.g., TIPS, RT1) should be ensured by core systems' gateways. The connectors could be multiple in case the PSP decides to participate in various CSMs to reach a wider network, as most of them are not yet interoperable.

Fraud prevention

As the speed of execution decreases, so does the time dedicated to anti-money-laundering (AML) analysis. Although this time becomes almost insignificant in the execution of instant payment transactions, it remains a major step that PSPs must perform in order to ensure a secure payment environment for both customers and financial institutions. In an instant payment scheme, in just a few seconds, PSPs will match customer and transaction information against sanction and high-risk lists. The implementation of instant payment shall in no case be a legitimate excuse to jeopardize an efficient AML compliance screening process. Therefore, PSPs processing real-time payments shall optimize their AML screening process while efficiently managing client-related risk.
In order to fill this gap, an increasing number of third-party providers are offering real-time payment fraud detection software that enables the AML checks and sanctions screening processes to be carried out within seconds by using cutting-edge technologies such as artificial intelligence.

Implementation solutions

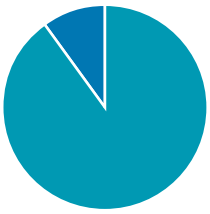
To overcome all these challenges and technological prerequisites to providing instant payments, PSPs have various options. Some of them will decide to treat Instant Payment separately, by implementing additional modules independent from their existing payment processes, while others will undertake a complete redesign of their payment architecture. In a nutshell, PSPs could decide to go through one of the three following solutions:

- Implementation of a payment hub able to handle all types of payments, including instant ones. This solution consumes time and money, but it offers an efficient improvement to the payment chain and an opportunity to modernize the whole PSP payment architecture.
- Implementation of a parallel payment chain that will be dedicated to the processing of the SCT Inst messages. It will be completely independent from the other current payment chains and will therefore have a limited impact on them.
- Enhancement of the legacy system by adding additional components that will take over when the back-end systems are not available. The major benefit of this solution is the low investment and rapid time-to-market; nevertheless, it is not a suitable long-term strategy since it will only add more complexity in an already complex architecture.

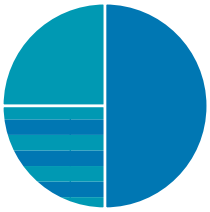
Regardless of the chosen solution, an instant payment architecture shall demonstrate both agility and scalability for the simple reason that real-time payment is expected to be the new standard.

EBA expectations on Instant Payments in the period 2017-2027:

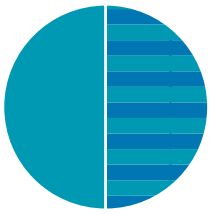
Credit Transfers



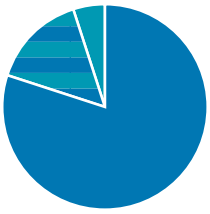
Debit Cards



Cheques



Cash



"Regular" payment method

Expected to be instant

Conclusion

The emergence of instant payment along with the entry into force of PSD2 and the trend toward Open Banking is leading PSPs, and especially traditional credit institutions, to make major changes to their payment architecture.

Some players have already decided to go beyond SCT scheme requirements by allowing the initiation of instant payment where phone numbers or email addresses replace the traditional IBAN (e.g., STET in France and Bizum, an instant payment application developed by seven major Spanish banks); while others are reducing the time limit for PSPs to instantly execute payments (i.e., Dutch banking sector initiative). These examples demonstrate that cooperation between PSPs could be a non-negligible alternative to being at the forefront of the race toward real-time payments.

No matter how PSPs decide to stay in the instant game, the long-term strategy should be considered carefully in the decision-making process, since instant payment is undoubtedly here to stay.

Digitalization of clinical trials

How new technologies enhance the future of health care

Luc Brucher
Partner
Public Sector & Healthcare Leader
Deloitte

Carlo Duprel
Director
Digital & Innovation
Deloitte

Alexandra Georges
Consultant
Public Sector & Healthcare
Deloitte

Yasmin Kilders
Consultant
Public Sector & Healthcare
Deloitte

Medical care has improved dramatically in recent decades, leading to a better quality of life for patients and their relatives. However, biopharma companies admit that there is still progress to be made with regard to the clinical trial process, particularly in terms of high Research and Development (R&D) costs, risk of failure, and reliability of data due to archaic procedures. It would seem that the current way of conducting clinical trials is nearing an end. As the world progresses to a more digitalized era, clinical trials are driven by the adoption of new technologies, which quickly accelerate the digital transformation of their processes.

The pharmaceutical industry has supported the rise of new perspectives and approaches related to clinical trials since the 1990s. Over the past thirty years, clinical trials have undergone a substantial redesign with the introduction of process and cost optimization strategies such as Business Process Outsourcing (BPO) or risk-based monitoring[1]. Nevertheless, none of the initiatives have resulted in a noticeable change, despite the substantial investments made to reduce cost and time inefficiencies in clinical trials.

As stated by the World Health Organization (WHO)[2], many health care systems in Europe face huge challenges when they consider introducing a new drug to the market. High costs and risks as well as time-consuming protocols reduce the efficiency of the whole drug development process. Clinical trials constitute an important part of the drug development lifecycle and rely on accurate and sufficient data for the validation of the study and of the new drug. Since clinical trials take a long time and depend on the continuous monitoring of many participants, the digitalization of data collection could significantly improve the process and bring about efficiency gains.

Today, more than 30,000[3,4] clinical studies recruit patients in Europe alone, with some requiring thousands of participants, all of whom need to fulfil a precise set of criteria in order to participate. Most clinical trials currently rely on archaic, paper-based data collection and require that participants regularly visit the trial sites in hospitals or research centers. From participant recruitment, to data collection, to adherence, the early stages of clinical trials are full of logistical challenges and inefficiencies. This causes delays in most trials and leads to billions of euro and countless hours spent each year validating new drugs, devices, and medical interventions[5].

1 Clinical trials at a digital inflection point, Wipro, 2016
2 Access to new medicines in Europe: technical review of policies initiatives and opportunities for collaboration and research, World Health Organization, 2015
3 https://www.clinicaltrialsregister.eu/ctr-search/trial/2017-003847-39/LT
4 http://www.who.int/research-observatory/monitoring/processes/clinical_trials_1/en/
5 Luxembourg towards a smart nation: providing the keys to unlock our country's potential, Deloitte Luxembourg, 2018

Considering the current state of data collection and the resulting data quality, adjustments to the process are cumbersome.

Therefore, the situation is clear; clinical trials require major changes to their processes to evolve in order to reach a point where they embrace the digitalized era. Before covering the impacts digitalization could bring to clinical trials, this article will first look at the different reasons that strengthen the case for change.

Quality of data

As mentioned, paper-based data collection represents a major issue for the accuracy and quality of data generated in clinical trials. The complexity of the trial process requires patients to not only be available at predefined times for data collection, but also to be physically present at the trial center or at the hospital to complete patient surveys known as patient-reported outcomes (PRO). Several studies[6] found that patients' replies to surveys are often delayed or they do not reply at all. This whole approach mainly leads to a loss in terms of data quality. The systematization of data collection should be favored, requiring the standardization and digitalization of the collection process.

Flexibility of the process

The clinical trial process is quite rigid and does not allow for much flexibility[7]. Indeed, strict protocols and procedures need to be followed and changes are tedious to implement. Hence, changes can only be made when trial sponsors are well informed about the current results and can make decisions based on timely access to relevant data. Considering the current state of data collection and the resulting data quality, adjustments to the process are cumbersome. The problem also appears when it comes to the collection of data by the different collection centers acting on behalf of the trial sponsors. These centers may use different approaches to collect data and the lack of a standardized approach may result in difficulties for the trial sponsors to exploit the data collected. Therefore, it appears obvious that new technologies provide the opportunity to improve the efficiency of the clinical trial process management by tackling the lack of standardization and continuity in the collection, exchange, treatment, and storage of data throughout the process.

Patient adherence

One of the major issues faced today when it comes to clinical trials is patient adherence. 85 percent of clinical trials fail to retain enough patients[8]. In order to achieve relevant results to pursue the drug development process and justify their market launch, the commitment of patients during the trial process needs to be ensured. Nevertheless, several studies show a 30 percent dropout rate across all clinical trials. The lack of patient involvement results in poor patient retention along the process and often leads to unusable data and high investment losses. The main reasons[9] for dropping out are, among others, inconvenient schedule or location, intensity of the process, and misunderstanding of the expectations and side effects[10].

Nowadays, pharmaceutical companies are under pressure to bring increasingly targeted solutions and medicines to the market. The issues faced during drug development, including clinical trials, highlight the need to focus on innovative solutions in order to reduce costs and increase trial efficiency. The

digital transformation of clinical trials will require a thorough reassessment of current regulations pertaining to personal data management. This will surely have a positive impact on the delivery time to launch therapeutic innovations on the market, while relying on data collected directly during the patients' daily lives[11].

In order to tackle the issues faced during the clinical trial process, the main actors in drug development have decided to work together to meet the requirements to expedite the digitalization of trials. In 2012, several global pharmaceutical companies joined forces to form the non-profit organization TransCelerate BioPharma, with the purpose of investigating how digital technology can be leveraged to improve clinical trials[12]. With the same ambition, the US Food and Drug Administration (FDA) recently started working on new regulations and guidance to define the groundwork for advances in digital health and to facilitate the incorporation of digital therapeutics into drug development and clinical trials[13].

To ensure the efficiency of clinical trials based on these new perspectives, an innovative strategy called patient-centricity has recently emerged. Patient-centricity relies on clinical trials focused on the patient in order to better respond to their needs and ensure their commitment throughout the clinical trial process[14]. However, the main goal of patient-centricity is the empowerment of patients in order to attract, involve, and retain them. In particular, patient-centricity aims to engage patients to lead them to become active partners by incorporating their points of view and considerations into the trial process, thereby increasing patient retention and reducing trial failures.

Capitalizing on new technologies, sponsors of clinical trials such as Sanofi and Pfizer have aligned their business development strategies and designed new apps and wearables that not only enhance the collection of data, but also improve direct communication with patients, making it possible to adjust the study on a timely basis. With apps and wearables directly connected to the patient's phone, clinical trials can now have access to data based on the patient's daily behaviors. Data is also more accurate and better reflects the reality of patients' lives. Indeed, instead of going to a clinical center where trials are conducted in an extraordinary environment, a drug's effects can now be tested by patients from their homes and collected directly through their digital devices, creating a whole new clinical trial ecosystem[15] where the data collected is more reliable.

However, digital devices not only improve the quality of data collected, they also facilitate the diversification of the population tested in order to reflect the demographic diversity that drugs need to cover.

Embracing the digital era, sponsors involved in digital trials refer to four main benefits of digitalization[16]:

01. Cost-reduction by 50 percent per participant compared with current on-site clinical trials
02. Increased recruitment rate and diversification by making trial participation more convenient
03. Increased data collection on participants, since longer time spans can be monitored (up to 75 times more)
04. Increased data quality based on participant's natural environment instead of on-site-collected data

Conclusion

New technologies have drastically changed the way in which clinical trials are being conducted. Recent initiatives from global healthcare companies and governments demonstrate their willingness to catch up with current developments in the approach to performing clinical trials, which is dominated by the digitalization of process and data collection. Facing pressure in terms of costs and risks, big pharma companies now count on the adoption of digitalization to increase the efficiency of clinical trials and provide the market with targeted drugs that respond to the ever-increasing complexity of patient needs. Nevertheless, progress is still required to ensure that the relevant stakeholders work together to support the incorporation of digital technologies in the clinical trial process.

6 Current practices in patient-reported outcome (PRO) data collection in clinical trials: a cross-sectional survey of UK trial staff and management, Kyte D, Ives J, Draper H, et al., BMJ Open, 2016
7 Clinical trials: how technology is driving digitisation, Cambridge consultants, 2018
8 Global Clinical Trials for Alzheimer's Disease: Design, Implementation, and Standardization, Menghis Bairu, Michael Weiner, 2013
9 Retention in clinical trials: keeping patients on protocols, Forte research, 2015
10 Solutions digitales appliquées aux essais cliniques : la santé connectée, Liza Voisine, 2016
11 Technologies : le potentiel de transformation du numérique pour le futur de la recherche clinique, Deloitte France, 2014
12 In-Depth: the rise of the digital clinical trial, Dave Muoio, 2017
13 FDA Releases New Digital Health Draft Guidance Documents, Moe Alsumidaie, 2017
14 What Patient Centricity Means to a Patient, Moe Alsumidaie, 2017
15 The Digital Clinical Trial: An Ecosystem View, Edetek, Peter Smilansky, Tom Guinter & Monique Garrett, 2018
16 Software-Enabled Clinical Trials, Andy Coravos, 2018

Contacts

Editorial committee

Joël Vanoverschelde
Partner – Advisory
& Consulting Leader
+352 451 452 850
jvanoverschelde@deloitte.lu

Pascal Martino
Partner – Strategy & Regulatory
& Corporate Finance
Digital and Banking Leader
+352 451 452 119
pamartino@deloitte.lu

CIO services

Patrick Laurent
Partner - Technology &
Innovation Leader
+352 451 454 170
palaurent@deloitte.lu

Steve Hauman
Partner - Technology &
Enterprise Application
+352 451 453 352
shauman@deloitte.lu

Michael Holzmann
Partner – Technology
& Enterprise Application
+352 451 453 283
miholzmann@deloitte.lu

Jean-Pierre Maissin
Partner - Technology &
Enterprise Application
+352 451 452 834
jpmaissin@deloitte.lu

Hervé Marchand
Partner – Technology
& Enterprise Application
+352 451 452 292
hmarchand@deloitte.lu

Ronan Vander Elst
Partner - Technology &
Enterprise Application
+352 451 454 322
rvanderelst@deloitte.lu

CEO & CFO services

Benjamin Collette
Partner – Strategy, Clients &
Industries, FSI Leader
+352 451 452 809
bcollette@deloitte.lu

Laurent Collet
Partner – Strategy, Regulatory
& Corporate Finance
+352 451 452 112
lacollet@deloitte.lu

Petra Hazenberg
Partner – Strategy, Regulatory
& Corporate Finance
+352 451 452 689
phazenberg@deloitte.lu

Joachim Heukmes
Partner – Strategy, Regulatory
& Corporate Finance
+352 451 452 037
jheukmes@deloitte.lu

Jean-Pierre Lequeux
Partner – Strategy, Regulatory
& Corporate Finance
+352 451 453 598
jlequeux@deloitte.lu

Frank Lichtenthäler
Partner – Strategy, Regulatory
& Corporate Finance
+ 352 451 454 387
flichtenthaeler@deloitte.lu

Pascal Martino
Partner – Strategy & Regulatory
& Corporate Finance
Digital and Banking Leader
+352 451 452 119
pamartino@deloitte.lu

Pierre Masset
Partner – Strategy, Regulatory
& Corporate Finance
+352 451 452 756
pmasset@deloitte.lu

COO & CHRO services

Basil Sommerfeld
Partner – Operations Excellence
& Human Capital Leader
+352 451 452 646
bsommerfeld@deloitte.lu

Annick Elias
Partner – Strategy, Regulatory
& Corporate Finance
+352 451 454 386
aelias@deloitte.lu

Michael Cravatte
Partner – Operations Excellence
& Human Capital
+352 451 454 758
mcravatte@deloitte.lu

Pascal Eber
Partner – Operations Excellence
& Human Capital
+352 451 452 649
peber@deloitte.lu

Marco Lichtfous
Partner – Operations Excellence
& Human Capital
+352 451 454 876
mlichtfous@deloitte.lu

Simon Ramos
Partner – Advisory & Consulting
Investment Management Leader
+352 451 452 702
siramos@deloitte.lu

Arnaud Willems
Partner – Operations Excellence
& Human Capital
+352 451 453 309
awillems@deloitte.lu

CCO/CISO/CRO/CIA/BOD services

Laurent Berliner
Partner – EMEA FSI Risk
Advisory Leader
+352 451 452 328
lberliner@deloitte.lu

Roland Bastin
Partner – Information
& Technology Risk
+352 451 452 213
rbastin@deloitte.lu

Eric Collard
Partner – Capital Markets
& Financial Risk
+352 451 454 985
ecollard@deloitte.lu

Thierry Flamand
Partner – Insurance Industry
Leader
+352 451 454 920
tflamand@deloitte.lu

Stéphane Hurtaud
Partner – Cyber Security Leader
+352 451 454 434
shurtaud@deloitte.lu

Michael JJ Martin
Partner – Forensic, AML
& Restructuring
+352 451 452 449
michamartin@deloitte.lu

Jean-Philippe Peters
Partner – Business Risk
+352 451 452 276
jppeters@deloitte.lu

Financial Industry Solutions

Vincent Gouverneur
Partner – Investment Management Industry Leader
+352 451 452 451
vgouverneur@deloitte.lu

Sylvain Crepin
Partner – Financial Industry Solutions
+ 352 451 454 054
screpin@deloitte.lu

François-Kim Huge
Partner – Financial Industry Solutions
+352 451 452 483
fkhuge@deloitte.lu

Lou Kiesch
Partner – Financial Industry Solutions
+352 451 452 456
lkiesch@deloitte.lu

Xavier Zaegel
Partner – Financial Industry Solutions
+352 451 452 748
xzaegel@deloitte.lu

Audit & Assurance

Christiane Chadoeuf
Partner – Audit Business Leader
+352 451 452 065
cchadoeuf@deloitte.lu

Tax

Raymond Krawczykowski
Partner – Tax Business Leader
+352 451 452 500
rkrawczykowski@deloitte.lu

Banking

Pascal Martino
Partner – Banking Industry Leader
+352 451 452 119
pamartino@deloitte.lu

Deloitte Private

Pierre-Jean Estagerie
Partner – Deloitte Private Industry Leader
+352 451 454 940
pjestagerie@deloitte.lu

EU & Supranational

Jean-Pierre Maissin
Partner – EU & Supranational Industry Leader
+352 451 452 834
jpmaissin@deloitte.lu

Insurance

Thierry Flamand
Partner – Insurance Industry Leader
+352 451 454 920
tflamand@deloitte.lu

Investment Management

Vincent Gouverneur
Partner – Investment Management Industry Leader
+352 451 452 451
vgouverneur@deloitte.lu

Large and Listed Industry

Bernard David
Partner – Large & Listed Industry Leader
+ 352 451 452 799
bdavid@deloitte.lu

LaCo Industry

Christophe de Sutter
Partner – LaCo Industry Leader
+352 451 453 503
cdesutter@deloitte.lu

LCSP Club

Benjamin Lam
Partner – LCSP Club Leader
+352 451 452 429
blam@deloitte.lu

Non FSI

Georges Kioes
Partner – Non FSI Leader
+352 451 452 249
gkioes@deloitte.lu

Private Equity

Nick Tabone
Partner – Private Equity Industry Leader
+352 451 452 264
ntabone@deloitte.lu

Public Sector & Healthcare

Luc Brucher
Partner – Public Sector & Healthcare Industry Leader
+352 451 454 704
lbrucher@deloitte.lu

Real Estate

Lize Griffiths
Partner – Real Estate Industry Leader
+352 451 452 693
lizgriffiths@deloitte.lu

SME

Jean-Philippe Foury
Partner – SME Industry Leader
+352 451 452 418
jpfoury@deloitte.lu

Technology, Media and Telecommunications

David Osville
Partner – TMT Industry Leader
+352 451 452 941
dosville@deloitte.lu

Please do not hesitate to contact your relevant experts in the magazine.

Our expert authors, who are brimming with excitement about these disruptive topics, have written articles to help decision-makers to apprehend the new paradigms—if not to understand them all.

Deloitte.

Designed and produced by MarCom at Deloitte Luxembourg