

A complex financial data visualization on a dark blue background. It features a candlestick chart at the top, a bar chart in the middle, and a line chart at the bottom. The candlestick chart shows price fluctuations with white and blue bars. The bar chart below it shows volume or another metric. The line chart at the bottom has several lines with circular markers. The overall aesthetic is technical and data-driven.

# connected currency

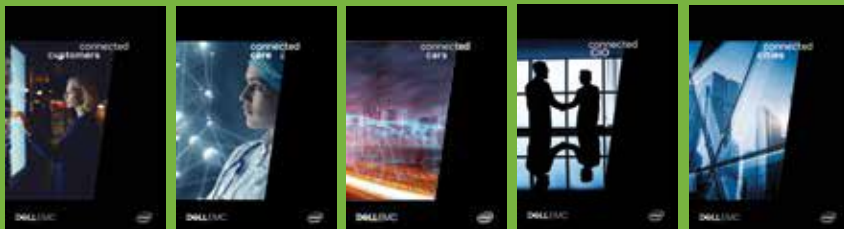
**DELL**EMC



Dell EMC, a part of Dell Technologies, enables enterprises to reinvent their business through Digital Transformation.

'No man is an island.' Nor is any system, organization or industry. The CONNECTED series dives into this new reality of 'everything connected'. It gives you the latest insights on digital transformation.

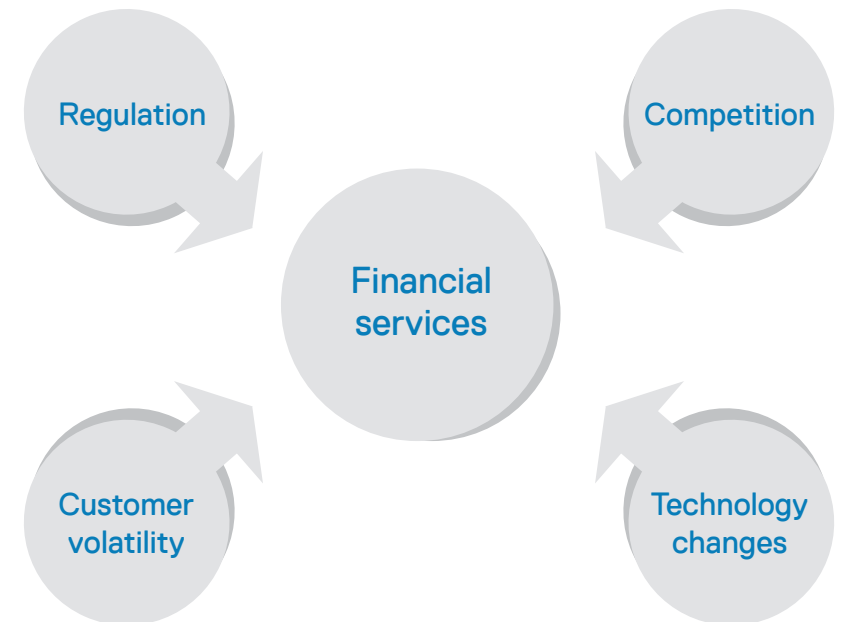
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## EXECUTIVE SUMMARY

Connected currency is transforming the financial services' IT world, and IT is banking's best shot at extracting business value from connected currency.



The financial world is the **centerpiece** of the world's economy. Nation states rise and fall with it, and the **Credit Crunch of 2008** showed **the power** it wields on the global stage. Like any market, finance is hugely impacted by the **successive, disruptive revolutions in technology**.

## The great disruption

The finance world is under pressure from various directions:

- Legal and political **regulation** bring compliance center-stage
- Nimble and **new kinds of competitors** are entering from the fintech world
- A new **technology wave** is changing the finance sector
- Increased **customer volatility** and empowerment

What role can IT play in all of these challenges?

- 25 years ago, the challenge in digital transformation was to move from analog to digital ways of working to **increase efficiency and speed** as well as instantly connect banks to the world.
- 10 years ago, the challenge was to **move to real-time**: a customer who would withdraw money should immediately see the balance change, and not a day later.
- Now, the **capabilities of IT have grown exponentially** and the availability of vast amounts of critical data has created another holy grail: **predictive analytics**.

# 13%



2016 SAW AN INCREASE OF 13%, YEAR-ON-YEAR, IN CUSTOMERS SWITCHING TO ANOTHER BANK. THE DAYS OF CRADLE-TO-GRAVE BANKS THAT CAN RELIABLY SPAN GENERATIONS ARE OVER.

Source: The Telegraph



## CHAPTER 1

# New technology opportunities and threats

Financial services are confronted with an **unprecedented wave** of new technologies. And the trends show no sign of slowing down.

The **Internet of Things (IoT)** and **blockchain** are the two biggest standouts in terms of fast-growing technology areas.

In the mobile market, banks compete against lean **microcredit** and microtransaction companies as well as **digitally native** companies (e.g. Facebook).

As for **AI**, banks had best start preparing for its arrival today.

Having the right **technology backbone** can be the supreme enabler to turn technologies into **value drivers**.

## Hello, this is your account speaking

The Internet of Things has value in and of itself for companies by opening up many more channels of information. But banks can use it to gain **direct business value**, too.

## Because a 'thing' can also be abstract, why not outfit finance products for IoT?

For instance, imagine getting a **financial health report** straight from your IoT-enabled bank account after you've received your salary. All kinds of automated notifications become possible. An IoT-enabled finance product could also generate **context-based advice** based on saving and spending habits.

An IoT-enabled stock portfolio could alert its owner that now might be a good time to sell or buy. Or it could **constantly monitor** market fluctuations when its owner doesn't have the time or energy to do so.

## Sharper profiling

### Customer profiling becomes more accurate with the aid of IoT.

Banks can create **very personalized product offers** based on this data, while bankers can more readily profile their customers during face-to-face interactions, e.g. automatically bringing up details from previous meetings or getting a deeper understanding of a **customer's personal background**.

This personalization can be extended to insurance. IoT could be used to track insurance conditions, e.g. **trackers on electrical appliances** could tell the insurer whether someone knew they were at risk of causing fire in case of an investigation after a house fire.

## IoT can make insurance fairer by rewarding good behavior.

After all, if we can collect data from cars that prove a diligent driving record, why not immediately offer the insured some kind of premium reduction? And what could an insurer ask for more than a safe investment?

**\$15 trillion**



DELOITTE'S HIGHBALL ESTIMATE OF THE IOT MARKET'S WORTH BY 2020. DELOITTE BRANDS THE MARKET AS A "REAL OPPORTUNITY" FOR FINANCIAL SERVICES.

Source: Deloitte

**26 billion**



GARTNER ESTIMATES A 30-FOLD GROWTH IN IOT-CAPABLE DEVICES BY 2020, COMPARED TO THE 0.9 BILLION UNITS IN 2009. BY COMPARISON, THERE WILL 'ONLY' BE 7.3 BILLION ACTUAL COMPUTERS BY 2020.

Source: Gartner

## The competitive squeeze

Other players have entered the finance market and more **keep coming in**.

Many supermarket chains or car brands, for instance, have already set up their own types of loan or credit services **independent of traditional banks**.

## The real wake-up call is the European Union's revised Payment Services Directive.

PSD2, as it's called, will become law in 2018 and lifts some restrictions on the types of financial services non-banks can offer their clients. In this way, smaller players will find it easier to compete with big institutions.

In addition, PSD2 requires banks to **harmonize their governance framework** and publicly release their APIs. This is all in service of creating a unified European finance market.

**"The pie gets bigger,"** Viola Hellström of Evry says. Because banks across European Union countries will operate according to the same rules, this means that consumers will be more aware of how easy it is to buy financial products in another country.

Most banks are already present as **recognizable brands** in multiple countries, unlike new market entrants. As a result, competition in the financial market is likely to intensify.

So traditional financial services are actually in a **good competitive starting position**.

+2%



BANKS COULD EXPERIENCE THIS UPTICK IN REVENUE BY ENTERING THE P2P LENDING LANDSCAPE.

Source: Orchard

*"In the near future, you may be using Facebook or Google to pay your bills."*

Viola Hellström  
VP Financial Services, Evry

## P2P: the Uber of lending?

Peer-to-peer lending (P2P), a **form of disintermediation**, leaves classic finance institutions understandably worried.

After all, loans are generally considered a **profitable, long-term banking product**. Additional competition in this area is felt to be almost existential. But...

Nothing prevents banks from becoming part of the P2P lending landscape.

Banks certainly already have the **know-how and the specialists** on board to do loans. P2P lending is just a different place where they can deploy that expertise.

This makes P2P lending a **new area of business**, not an alien threat.

9%



LENDING SPECIALIST ORCHARD ESTIMATES THIS TO BE THE AVERAGE YIELD OF A P2P LOAN. THIS PUTS IT SLIGHTLY AHEAD OF THE CLASSIC BANK LOAN.

Source: Orchard

\$11 billion



THIS IS THE AMOUNT OF VALUE TRADITIONAL FINANCIAL INSTITUTIONS RISK TO LOSE WHEN THE P2P LENDING MARKET MATURES.

Source: Orchard



## A CLOSER LOOK – DELL EMC CUSTOMER CASE

### SECURE, STREAMLINED AND SPEEDY – CRÉDIT AGRICOLE MOVES TO THE CLOUD

**1 Customer** – French bank Crédit Agricole is one of Europe's largest financial groups. In France alone, it serves 25 million customers a day.

**2 Challenge** – As a co-operative, it is a highly decentralized organization by nature. To render its business more agile and competitive, it decided to invest in new technologies. In this case, Crédit Agricole opted for a private cloud setup. It needed to convince its decision-makers.

- \* that the system would be both secure and
- \* would meet the stringent demands for high availability.

**3 Solution** – The financial group found its partner for their business and IT transformation in Dell EMC. More specifically, it chose a setup of twin VBlock Systems in two geographically separate data centers. The new private cloud architecture hosts critical production systems on a standardized, streamlined infrastructure.

**4 Benefits** – IT infrastructure agility has significantly improved since the new system was implemented. The setup is resilient enough to cover all eventualities. Banking applications are taking advantage of the technical paradigm in terms of cost optimization and speed. In turn, Crédit Agricole's IT teams can focus on delivering added value for the business.

*“There's lower cost of doing business overall. This was demonstrated by one of our business units, which realized 25% IT infrastructure savings in moving to the private cloud, and has become a convert to the cause.”*

Lou Gallagher  
Systems Director, HealthEast Care System

## Cryptocurrency: threat or opportunity?

The first and still most famous cryptocurrency, Bitcoin, started out in 2009. The difference with earlier virtual types of currency, most often found in MMORPGs (massively multiplayer online role-playing games) such as Second Life or EVE Online, is that the creators of these games had some form of control over their in-game currency market. Cryptocurrencies are **fully decentralized**.

Cryptocurrency is perhaps the flashiest new finance technology. How does it relate to banks and how should finance institutions relate to it?

On the opportunity-threat scale, cryptocurrency is all over the place.

**\$19.5 billion**

BUSINESSWIRE SAYS THIS IS THE CURRENT NET WORTH OF THE GLOBAL BITCOIN MARKET.

Source: BusinessWire



## TERMINOLOGY REFRESHER

- ♦ **Cryptocurrency:** currencies that use cryptography algorithms to control production and exchange
- ♦ **Bitcoin:** the most famous cryptocurrency, based on blockchain technology
- ♦ **Blockchain:** a distributed, decentralized database whose constituent parts interlink and have an unchangeable timestamp and link back to a previous block.





## Growing pains

While hailed by enthusiasts as a type of currency that is completely safe, international and free of traditional corporate and government influence, cryptocurrencies still face a number of inherent difficulties.

**1 Legality** - In many countries, the legal status of cryptocurrencies is uncertain, partly because its economic impact is felt to be negligible, partly because there is little governmental expertise in the matter. When cryptocurrencies do attract attention, it's not always positive. Sometimes its use as tender is **outright banned** (e.g. in Russia), or the **negative attention** it attracts scares users and investors (e.g. in India).

**2 Crime and fraud** - Due to their decentralized nature and **weak regulation**, cryptocurrencies are **attractive for cyber criminals** to remain under the radar. This damages the public cryptocurrency brand.

**3 Chaos** - With no instance to provide stability in the cryptocurrency market, the actual value of cryptocurrency can **fluctuate wildly** from one week to the next, making it an uncertain investment choice.

This **chaos extends to branding**, too. Relying almost solely on the enthusiasm of a user base is not a substitute for directed marketing and storytelling.

**4 Limited use** - Many instances **do not accept** cryptocurrencies as a valid form of payment. It also still has a long way to go to gain acceptance from states or state-like instances, usually for a mix of ideological and security reasons.

All these challenges currently do not make cryptocurrencies a big threat for traditional finance the way they are sometimes made out to be – yet.

All these hurdles can eventually be overcome.

The use of cryptocurrencies is **likely to stay** and might one day even soar if people become more and more familiar with increasing virtualization of large parts of their lives.

Classic financial services can earn their place in the P2P loan landscape.

# 120+

... NATION STATES OR STATE-LIKE ACTORS HAVE ATTITUDES TO BITCOIN RANGING FROM UNCERTAIN (E.G. MOST MIDDLE-EASTERN COUNTRIES) TO OUTRIGHT HOSTILE (E.G. RUSSIA, BOLIVIA AND ICELAND).

Source: CoinDesk



*“Access to financial services can play a critical role in reducing poverty.”*

Huffington Post

## Growth spurts

Despite their challenges, cryptocurrencies also provide **opportunities** in niches and markets where traditional banks currently have little reach.

**1 The unbanked** - To gain access to cryptocurrency, all users need is a **smartphone and an internet connection**. This is especially appealing to customers in developing countries, where smartphones are already widespread but banking infrastructures are not always strong.

Becoming cryptocurrency-friendly could be part of a strategic outreach to developing economies.

This isn't just interesting for banks. Reliable access to finance can help "offer **a safe, convenient, and affordable way** to save and make and receive payments," says Leora Klapper, lead economist for the World Bank's Development Research Group in a Huffington Post interview.

**2 The wary** - By nature, blockchains can't be changed retroactively. Its information is transparent and safe: a dream for customers that wish to see more transparency from financial services.

**3 Crowdfunding** - Because of its P2P technology, it dovetails well with crowdfunding platforms, which are not coincidentally platforms that have cut the middle man out of the equation.

But, as with other P2P technologies, **banks can become part of this network**, too.

In addition, cryptocurrencies have numerous applications for classic banking ventures as well, ranging from **securities to contract management to investment platforms**.

Traditional financial services also have a huge advantage over individual players and start-ups: they have much more data at their disposal to approach decision-making in this area.

Predictive analytics could be golden in the volatile cryptocurrency market.

Time and again, we will see that data equals (potential) value. The sooner finance players **start mining this asset**, the quicker they will get ahead.



# 26%



ACCORDING TO GREENWICH ASSOCIATES' 2016 BLOCKCHAIN ADOPTION SURVEY, OVER A QUARTER OF BANKS ALREADY OWNS CRYPTOCURRENCY ASSETS. WHILE SIGNIFICANT, IT'S BY FAR THE LOWEST PERCENTAGE AMONG THE FINTECH ECOSYSTEM THAT WAS POLLED. ALL OTHER PLAYERS SCORED IN THE LOW 30% AND BLOCKCHAIN TECH COMPANIES SCORED WELL OVER 90%.

Source: Greenwich Associates

## Opportunities ahead

A 2016 paper from the World Economic Forum boldly stated: “So, to fully reap the benefits of distributed ledger technologies, it is **in the interest of traders to have the central bank participate in the blockchain**. Eventually, having central banks on board could even lead towards dismantling central bank-managed payments systems. We can shift all clearing to the new, decentralised networks.”

This doesn't mean that IT experts at banks have to re-learn all their ABCs, so to speak. Apart from insourcing knowledge – which can certainly be a valid strategy – **two major options** emerge:

**1 Coopetition** - Coopetition, a portmanteau of cooperation and competition, is where banks make strategic partnerships with some entrants in one area while remaining competitors in another.

For instance, a bank can get into the blockchains of a certain cryptocurrency, but still remain in competition with the issuers of the currency.

**2 Outsourcing** - This puts the challenge of getting into markets and services like cryptocurrencies, IoT and P2P lending into the hands of trusted experts with minimal risk (or with as much risk/reward-ratio as the bank would like).

Governments certainly aren't sitting still, either. Some **governmental central banks** have been **looking into issuing their own cryptocurrencies**, such as the United States, China and Sweden.

## The dual-speed organization

It stands to reason that innovations or disruptions from the accelerating pace of changes in the IT world **will keep hitting banks**.

Part of the answer is to become more shock-resistant by adopting agile components in the IT and business model, leading to faster response times to changing conditions.

## Agile and industrial aren't necessarily at cross-purposes.

A solid, robust and industrialized part remains necessary for the day-to-day operations many customers still use (e.g. simple payments and withdrawals, interest calculations, etc.).

However, an agile component that responds quickly to sudden changes, such as an interdisciplinary team that has **shorter approval cycles**, can operate at the same time.

Ideally, banks and other finance institutions can adopt a dual-speed approach. By matching going concern with increased agility, organizations can combine the best of two worlds: **flexibility and consistency**.

Some trends require an agile approach, some do not. **Analytics** based on reliable and verifiable data can point CIOs in the right direction of what approach to take.



### KEY TAKEAWAYS FROM THIS CHAPTER

- IoT: potential value of data
- Mobile: expanded services portfolio
- P2P and social media: upsetting hierarchies
- AI: prediction

Cryptocurrencies are not the doom of banks (yet)

While banks face hurdles, they also have lots of growth opportunities

Banks should be getting into the blockchain technology via

- Coopetition
- Outsourcing

Dual-speed organizations offer a chance to thrive

## CHAPTER 2

# Mastering the data

Just like a huge pile of textiles doesn't magically assemble itself into a clothing line, similarly Big Data is just an abstract or fashionable buzzword **without the proper processes and approaches** in place. If it is left alone, it becomes **Dark Data**.

The potential and pragmatic applications of Big Data are huge. And **few organizations possess more data than banks** due to their size, history and omnipresence.

How can IT master the data to **extract business** value from it?

*“Technology will continue freeing financial advisors from mundane tasks.”*

Bu Lu, CEO and co-founder of FutureAdvisor  
Source: Business Insider UK

\$203billion



THE PROJECTED TOTAL MARKET VALUE OF BIG DATA ANALYTICS BY 2020.

Source: IDC



## WHAT IS DARK DATA?

Analyst firm Gartner says: “[...] the information assets organizations collect, process and store during regular business activities, but generally fail to use for other purposes.” It is analogous to dark matter, the stuff physicists believe comprises most of the matter in the universe, yet is invisible and undetectable to us.



## THE COMPONENTS OF BIG DATA?

- Volume: files, numbers, statistics, reports
- Variety: structured, unstructured or somewhere in between
- Velocity: real-time, batches or delayed

## Time for value

Here are some examples of how Big Data can be used - and already are being used - to a bank's advantage.

### 1 360° customer view

Knowing an individual customer's behavior, actions and profile much **more intimately** leads to the much-vaunted '**360° view**'. This is a complete overview, in one location, of how, why and when your customer interacts with you – and what they do.

This broader and deeper profiling can lead to a **closer contact** and **better advice**.

Close customer contact is a key driver in customer loyalty.

### 2 Stronger segmentation

Increased granularity of the customer typology can lead to **more personalized offers** and communication, **increasing likelihood of repeat business**.

This is part of the 360° on a macro level, by putting together all the information breadcrumbs you have on all of your customers. These can be in **several groups** at once.

For instance, Paul and Jamie reside at the same address and form a household. At the same time, Paul is grouped with Ben and Fatma, because they are all on the same type of loan plan and have comparable incomes.



*i*

**WHAT ABOUT PREDICTIVE CAPABILITIES?**

To be able to predict trends, capital flows and consumer behavior is the holy grail of current data analytics. It remains to be seen whether this will eventually be fully flawless, but trend indicators are sure to increase in terms of reliability and predictability, much like weather forecasts have become a lot more accurate over the past 50 years.



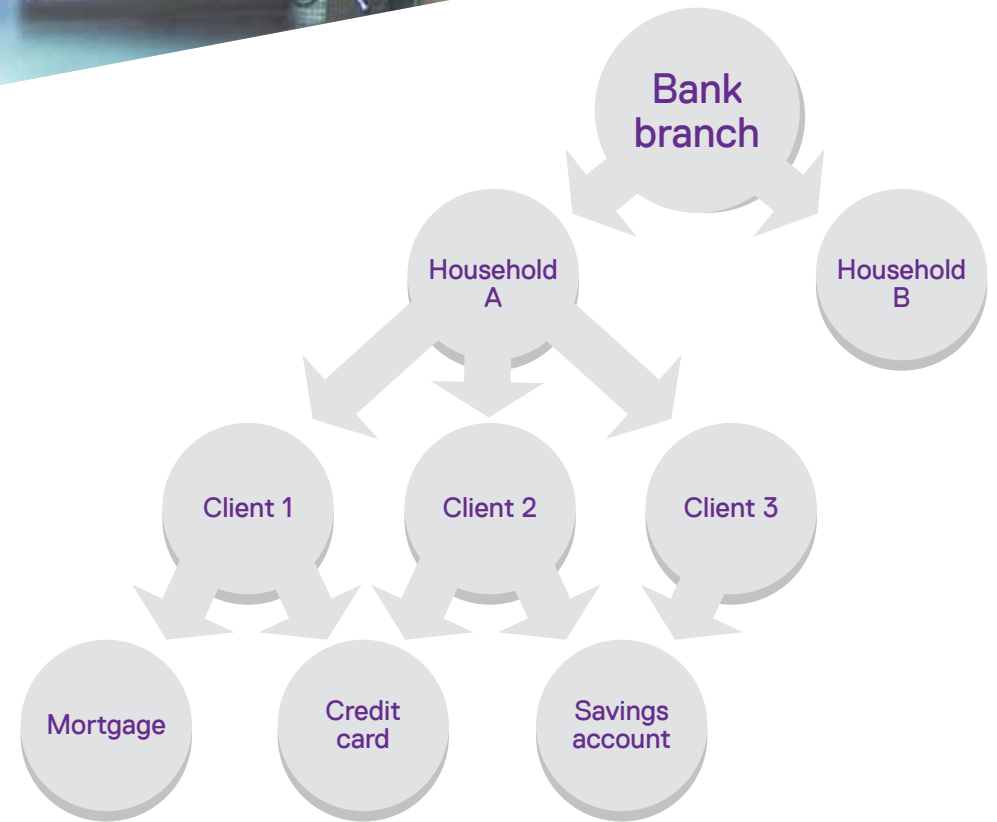
*“At the heart of any successful segmentation strategy is the ability to identify and assemble the right data points”*

Source: PWC report 'Customer Segmentation'

62% vs. 41%

62% OF BANKING CUSTOMERS ARE LIKELY TO REMAIN LOYAL TO THEIR BANK IF IT CAN GIVE ADVICE IN PIVOTAL LIFE DECISIONS. BY CONTRAST, ONLY 41% IS LIKELY TO REMAIN LOYAL IF THEIR BANK DOES NOT.

Source: Nicole Sturgill, CEB Principal Executive Advisor



SHARPER AND MULTI-SEGMENTATION OF CUSTOMER PROFILES

### 3 Risk analysis

In the modern bank, risk analysis is **equally as important as financial indicators and sales figures**. Here, too, data provided by IT can improve risk analysis and make it more reliable. The 2008 Credit Crunch proved there was still work to do in this area.

Automated systems that are based on benchmark data for 'normal' behavior can **constantly monitor for risk**. Users and actions can be grouped, too, according to behavior and risk pattern.

*“Every decision is a financial decision.”*

Tom Gramm  
CS Monitor

In a true data-driven bank, risk analysis is at the heart of all operations.

### 4 Sentiment analysis

Monitoring Big Data from a disparate array of sources helps IT understand the impact of business decisions or market trends on the customer and partner base.

*“Machine learning tools such as artificial neural networks make this prediction system self-learning and more precise.”*

Source: I Know First

These data streams can come from social media trends, indicators on IoT-enabled devices or macro trends.

It is widely known that people base decision-making on emotion as much as they do on cognition. Sentiment analysis can demonstrate the prevalence of emotional factors and see when and how people make certain decisions.

As Tom Gramm states in CS Monitor: “A trip to the grocery store has an astounding number of decisions. You are constantly choosing between products, what aisle to go down, whether or not to put that impulse buy into your cart, and so on.”

Another area of finance where Big Data's applications can shine is the stock exchange. Dr. Lipa Roitman, CTO and co-founder of I Know First, says: **“Machine learning provides distinctive insight to our comprehension of market dynamics and behavior.** The algorithm has a built-in general mathematical framework that generates and verifies statistical hypotheses about stock price development.”

### 5 Fraud and threat detection

Becoming better at knowing which data flows and behavioral patterns point to cases of fraud increase proactive security and improve customer satisfaction.

# 50%

CONSULTANCY FIRM KPMG ESTIMATES THAT APPLYING BIG DATA TECHNIQUES TO RISK ANALYSIS CAN INCREASE ITS EFFECTIVENESS BY 50%.

Source: 'How Big Data Can Strengthen Banking Risk Surveillance'

# 40%



ISENTIUM'S SENTIMENT ANALYSIS METHOD THROUGH SOCIAL MEDIA FOR MARKET CONDITIONS CUMULATIVELY OUTPERFORMED A REGULAR 'BUY AND HOLD' APPROACH BY ALMOST 40% OVER THE COURSE OF 2.5 YEARS.

Source: Twitter

# 55-84%

BETWEEN SLIGHTLY OVER HALF TO CLOSE TO NINE IN TEN STOCK TRADES ARE DONE BY COMPUTER PROGRAMS, WITH NO HUMAN DECISION-MAKING INVOLVED.

Source: Morgan Stanley / Tabb Group



## So you think you can analyze

In many financial organizations, analysis of data is hindered by a number of challenges.

- **Fragmentation:** if the IT infrastructure is too fragmented, even the best of analysts will have trouble seeing the wood from the trees.
- **Siloing:** departments aren't sharing their data or are duplicating processes and files without even knowing they are.
- **Lack of governance:** Big Data can't be adequately gathered or analyzed if there is no corporate framework for it.

So, the first prerequisite to leverage Big Data is the transformation and modernization of the IT infrastructure into a system that propagates a single source of truth.

IT transformation can go a long way to create a universe where data thrives.

Only when the IT setup is aligned with the business objectives and vice versa can data truly flow through the organization unimpeded. Then, it can be brought together to form the basis of a coherent analysis and action plan.

As such, transformation initiatives that want to take advantage of Big Data are not just about technology, but also about mentality.

The bank has to have one shared vision, and the customer is always central.



€160 billion

THE ANNUAL AMOUNT OF TAXES THE EUROPEAN UNION MISSES OUT ON DUE TO FRAUD.

European Commission



## A CLOSER LOOK – DELL EMC CUSTOMER CASE EOS KSI KNOWS WHEN IT'S PAYDAY - WITH SUPERIOR ANALYTICS

- 1 **The customer** - EOS KSI Česká Republika is a debt collection expert with 50 subsidiaries in 25 countries. Its expertise is in walking the line between not letting customers get away with outstanding debts, while simultaneously trying to ensure their goodwill for future business.
- 2 **The challenge** - While EOS KSI had an internal solution to sift through and analyze data, more versatility was needed to lift it to the next level. The company needed a much more far-reaching system that would use the data to analyze:
  - Whether or not to go to court
  - The best process phases to collect debt
  - Which debts were more likely to become delinquent
  - If standard collection steps could be skipped
- 3 **The solution** - EOS KSI opted for a solution based on Dell Statistica Data Miner. It would help the company build probability models and specify optimal collection strategies for each debtor profile. It also offered ways for EOS to gain a more profound understanding of its customers, and automated reporting activities.
- 4 **Benefits** - EOS can now use payment probability and debtor characteristics and behavior to drive the collection process. Instead of an intensive collection process for all unpaid debts, EOS can zero in on debts most likely to be paid. In addition, the company has been able to save 52 hours in administrative time each month through automation.



*“We were able to implement the Statistica solution quickly and easily, using our own employees - and our users find that the Statistica environment is intuitive and simple, even for non-analysts.”*

Ivan Fibir, Call Center Manager, EOS KSI



#### KEY TAKEAWAYS FROM THIS CHAPTER

Big Data can only be useful with

- ◆ The right mentality
- ◆ The right transformation
- ◆ The right availability
- ◆ The right analytics

There are a plethora of gains to be made in many previously intangible domains

- ◆ Behavioral and sentiment analysis
- ◆ Pattern recognition and trend prediction

Predictive analytics are on the horizon



## CHAPTER 3

# The keys to successful transformation

Today's mega-banks are the result of successive mergers and acquisitions in the preceding decades. **Each merger or takeover resulted in specific IT setups** fully or partially becoming part of the **larger IT infrastructure.**

The result was what is commonly known as the **"IT spaghetti"**, a chaos of interlinking, legacy and patched IT structures and solutions that is **hard to control, maintain and update.**

Aside from the **steep TCO** and the **almost arcane knowledge** required to maintain and update the system, these systems pose a risk.

Partly for that reason, IT is often **seen as a cost, not as a creator of business value.** But this perception can be completely turned on its head with **the proper transformation project.**

*i*

### THE FRAMEWORKS ARE HERE

BIAN, the Banking Industry Architecture Network, has thoroughly addressed the challenge of creating a professional IT framework for financial institutions.

This comes in handy in IT transformation, as it focuses on mapping the business needs onto the IT needs and manages to objectively identify both gaps and mismatches.

64%



... OF BANKS FEEL THEIR ABILITY TO CHANGE IS A GREATER CHALLENGE THAN SEEING THE NEED FOR IT

Source: Gartner

## Victorian cement

In an article in Computer Weekly, the chairman of the British Financial Services Club says:

**“Banks in the last century all held the view: ‘If ain’t broken, don’t touch it.’ [...] By the time the Internet came around, the cement was so thick that Internet banking was just added making the cement more like granite rock.”**

This granite rock becomes **a challenge when converting the IT setup** into something leaner. The chairman adds that **banks will look “Victorian by comparison to new competition or banks that have systems fit for purpose.”**

For a banking IT setup to be futureproof, several conditions need to be met.

*“We believe the next decade will be marked by the simplification of business.”*

EY, Global Banking Outlook 2015



## 1 Transparency

**Data must come from and flow to one unified point.**

Data has to be traceable and has to come from a **‘single source of truth’**, requiring systems that offer an easy look on how they generate data and where it’s coming from.

**Clear KPIs for the IT department help demonstrate its business value.**

In addition, these KPIs offer clear goals for what the system has to do as well as what it shouldn’t do.

Data traceability helps the entire organization, from sales and marketing to finance.

**Blockchain can again play a role in this.**

Several banks are already experimenting with this. “Across the world, banks are finding use cases for it. But it will ultimately **work when more banks adopt it**,” says Rajiv Anand, Executive Director of Axis Bank in an India Times article.

## 2 Scalability

It must be easy to enlarge IT capacities as the business requires it, **a type of scalability that is hard to achieve with traditional in-house server parks.**

Generally, this can be overcome with outsourcing. This **requires trust**. Banks are understandably skeptical of moving the infrastructure for their sensitive core banking systems someplace else. But the advantages are undeniable.

Banks (as well as other companies and industries) increasingly adopt and adhere to a hyper-converged infrastructure (HCI).

**With HCI, storage and computing are integrated and virtualized.**

It gives the CIO and the IT team the agility and flexibility it needs to tackle today's and tomorrow's challenges. It takes the focus of IT away from 'systems' and redirects it to 'applications'. It lets **IT come closer to the business again.**

### 3 Maintainability

For an IT infrastructure to be easy to maintain, it is best that it contains **as few proprietary interfaces and programs as possible**, making the system a single pane of glass, easier to get to know and use for new talent.

It also makes maintenance tasks much quicker if an IT employee doesn't have to sift through seven interfaces and applications, or has to learn ancient programming languages like Cobol.

In addition, legacy systems are often **"poorly documented**, forcing banks to rely on the knowledge and experience of a generation of workers who are nearing retirement," writes Deloitte in its report 'Why Legacy Is Not Enough.'

### 4 Customer orientation

**User experience** is one of the key elements in customer adoption and retention, especially in designs for mobile. However, it is **also important for a bank's employees**, who are a type of 'customer' in another way.

## User experience matters. It can motivate employees as well as customers.

This is non-trivial. The Financial Brand writes: "It is finally the right moment for banks to [...] make their services **clear, obvious and intuitive** for their users. Perhaps this is the most difficult task of all because of the need to **overcome existing internal politics** and an organizational culture."

### 5 Shock resistance

While sometimes, ad hoc interventions can't be avoided (e.g. in case of an unpreventable natural disaster), the IT setup needs to be **shock-proof** and have **built-in redundancy** to avoid major disruptions.

This includes **security concerns** around hacking and attacks, too. While transformation aspects "will not guarantee 100% protection against cyber attacks, implementing even a couple of these will boost your bank's ability to defend itself against today's sophisticated cyber attackers," says Itay Glick, CEO of Votiro.

# 62%

... IS THE NUMBER OF AMERICANS THAT RELY ON THE INTERNET AS THEIR PRIMARY BANKING CHANNEL. IN AN ERA WHERE A COMPETING FINANCIAL SERVICE PROVIDER IS JUST ONE CLICK AWAY, USER EXPERIENCE IS A KEY DIFFERENTIATOR.

Source: OpenLegacy



# 61% | 30%

ALMOST TWO OUT OF THREE BANKS ARE CURRENTLY DEVELOPING A CLOUD STRATEGY. ONE IN THREE ACTUALLY HAS A STRATEGY IN PLACE.

Source: The Cloud Security Alliance



# 78% | 70%

ACCORDING TO AN NTT DATA SURVEY, THIS IS THE AVERAGE PORTION OF A BANK'S IT BUDGET SPENT ON MAINTENANCE. 70% OF ALL BANKERS FEEL THEIR CORE BANKING INFRASTRUCTURE CAN'T ADAPT QUICKLY ENOUGH TO CHANGE.

Source: Twitter





## A CLOSER LOOK – DELL EMC CUSTOMER CASE

### BANK OF IRELAND ACCELERATES ITS MORTGAGE APPLICATION PROCESS WITH 75%

- 1 The customer** - Bank of Ireland is one of the 'Big Four' Irish banks. Its subsidiary in the United Kingdom seeks to be more than 'just' a bank. For instance, it partners with the UK Post Office to serve over 3 million customers with mortgages, savings, loans and foreign currency exchanges.
- 2 The challenge** - Bank of Ireland UK has lofty ambitions. It wanted to triple its number of mortgages, both directly and through its channel partner network. That meant deeper partner relationships, simplifying mortgage application processes and rendering the IT back-end more efficient. In other words, Bank of Ireland UK was looking at digital transformation.
- 3 The solution** - To develop a highly customized IT setup that would deliver, Bank of Ireland UK formed a strategic partnership with Dell EMC. From initial consultancy to implementation, Dell EMC developed a back-end that met the requirements for efficiency, ease of use and flexibility. It integrated the system within the existing IT setup and never lost track of the end-user experience.
- 4 Benefits** - In less than a year, Bank of Ireland UK was able to launch its new mortgage sales platform.
  - Where it had taken approximately one hour to complete a mortgage application on the old system, the new system took about 15 minutes.
  - Within the first three months, the bank reeled in over £250 million in new mortgage applications.



# 300x



BANKS ARE ATTACKED BY HACKERS, MALWARE AND OTHER HOSTILE ACTORS 300 TIMES MORE THAN ANY OTHER TYPE OF COMPANY OR INDUSTRY.

Source: Websense Security

*“Dell EMC played a significant role as our digital transformation partner, helping shape our vision and turn that vision into a reality. We made a substantial investment in understanding and delivering what the business, consumers, brokers, and our partners wanted-and that has paid huge rewards.”*

Jonathan Workman, Program Director, UK Mortgages, Bank of Ireland

## From blueprint to reality

There are many ‘best practices’ for digital transformation out there. For the financial sector, these chiefly come from the Banking Architecture Industry Network (BIAN).

Many software and hardware vendors as well as technology alliances have built their own versions. **Some banks have done so as well.**

For instance, Deutsche Bank “has built a “storybook” of structured processes for migrating checklists, command center structures, communications structures and all of the other changes needed to facilitate a cutover from one system to another,” as noted in BankTech.

**Transforming the bank’s IT infrastructure is like spinal cord surgery.**

Just like damage to the spine can’t be remedied with a simple diagnosis and one operation, transformation is a **long-haul project**. Each part of it is risky, each part of it can be successful if the right methods are pursued.

Roughly speaking, most transformation exercises follow this path:

- 1 **Identification of challenges** and needs both within and without the business and how these relate to the IT landscape.
- 2 **Analysis** of function or process gaps in the system, bottlenecks and mismatches between IT and other departments.
- 3 **Drafting** an ideal setup based on the exercises in (1) and (2).
- 4 **Implementation**, usually through a piece-meal, gradual implementation that is less disruptive and guarantees a bank’s 24/7 uptime.
- 5 **Testing** the new setup and then finally validating it.

## The bank of the future

With the pace of technology changes being what it is, we cannot say what a bank will be in 30 years. Will it be **fully cloud-operated** and automated to such a degree that **bankers will all act as personal advisors** to their clients? Will new entrants take ever **bigger roles** or eventually **merge with existing** giants?

A truly shock-proof bank does not and will never exist, but finance providers can ready themselves for tomorrow’s challenges.

**Transformation can turn IT from a cost center into a creator of value.**



### KEY TAKEAWAYS FROM THIS CHAPTER

#### THE FIVE MUSTS FOR IT IN FINANCE

- ♦ Transparent: it must be clear what systems do and how they do it.
- ♦ Scalable: it must be easy to scale the system up or down.
- ♦ Maintainable: it must be convenient to update and well-documented how to.
- ♦ Customer-oriented: customer experience should be similar across services and channels.
- ♦ Shock-resistant: it must be anticipating coming evolutions and threats.

## CHAPTER 4

# The human factor

When talking about technology, it is easy to get lost in jargon and features and lost track of **what ultimately matters most: people.**

Consumers are keenly aware that their **data represents value** and that their privacy is under pressure.

The European Union's General Data Protection Regulation (GDPR) is one attempt at addressing these concerns, and it will have a real impact on **how companies and institutions treat data.**

Another aspect is the changing nature of the customer base. Due to a combination of factors, today's consumers are **hyper-aware, hyper-connected** and expect **hyper-personalized services.**

### *i*

#### THE RIGHT TO BE FORGOTTEN

Unlike Basel III, GDPR is legally binding in all European Union member states as from 2018. Citizens will have the right to withdraw consent to their data being processed, appeal automated decisions made on basis of that data as well as the right to data erasure.

## Beyond the limits of technology

How to treat the human-technology relationship in finance is **as much of an IT issue as it is a business issue**. Consider these challenges posed by technology in the customer relationship:

- **GIGO:** focusing on the wrong data to identify customer personas or track customer behavior will result in bad business decisions, also known as the 'garbage in, garbage out' problem.
- **Big Brother:** too much focus on the particulars of the customer may be offensive to them or may feel as privacy intrusions.
- **FinTech:** a certain number of people have an icy relationship with banks and believe fintech companies can work more to their advantage.

## The challenges posed by technology can also be solved by technology.

Banks are catching up with technologies and policies of their own. Gallup's tracking poll has shown a **slow increase in public trust** in banks in the US.

The positives have been **hovering near 30%** in the past few years, up from a dramatic 21% in 2012, but still nowhere near the 40-50% scores they enjoyed in the early '00s.

So there is work to do. **IT can step in and help out.**



# 57%

OVER HALF OF ALL AMERICANS BELIEVE THE TRADITIONAL FINANCIAL INSTITUTIONS WILL CEASE TO EXIST IN THEIR LIFETIME.

Source: Blumberg



# 75%

THREE QUARTERS OF AMERICANS THINK THE SERVICES AND PRODUCTS OFFERED BY FINTECH COMPANIES THAT COMPETE WITH BANKS GIVE THEM MORE POWER OVER THEIR FINANCES.

Source: Blumberg





## Well-connected, well-served

Today's consumers are more connected than ever, with a whole host of devices. This is the age of **hyper-connection**. All information to **compare services** and get advice from peers is just a click away.

## To remain the preferred partner, financial services have to step up their game.

An area where technology can have a positive impact is where banks can **aid customers in their purchasing decisions**.

Special apps can tailor consumer credit or bundle financial offers to **specific situations and very specific customer profiles**. This is made possible by the wealth of data the bank has that competitors do not have.

An example of this could be someone looking to buy a new television. The prospective, connected customer can immediately **compare the store's credit offer to their bank while in-store**.

## Positively impacting the consumer's life is a double win for the bank.

A loyal consumer is an asset, and a defeated competitor is now less likely to further encroach on the financial institution's home turf.

Other schemes to win back consumer trust is by **offering them classic incentives** such as profit sharing or loyalty bonuses. **Rationalized IT operations cut costs across the entire value chain**, and some of the extra revenue can be **reinvested in the customer base**.

# 4-5%

GDPR WILL PENALIZE COMPANIES WHO DON'T COMPLY WITH IT BY ISSUING FINES. THESE FINES ARE SET BETWEEN 4 TO 5% OF THAT COMPANY'S ANNUAL TURNOVER. IF E.G. MICROSOFT WOULD BE FINED FOR NON-COMPLIANCE BASED ON ITS 2016 SALES FIGURE.

Source: European Union



## The branch is dead, long live the experience center

Many banks are experimenting with **digital-only offshoots**. The rationale is simple: technology enables an almost automatic banking setup to be run (also known as a **'bank in a box'**) at much lower costs, and this allows the digital branch to offer more attractive rates to customers.

However, for many people, the **traditional banking branch is still important**. In fact,

according to Salesforce research, most customers still use the branch as the place to **seek financial advice** (58%).

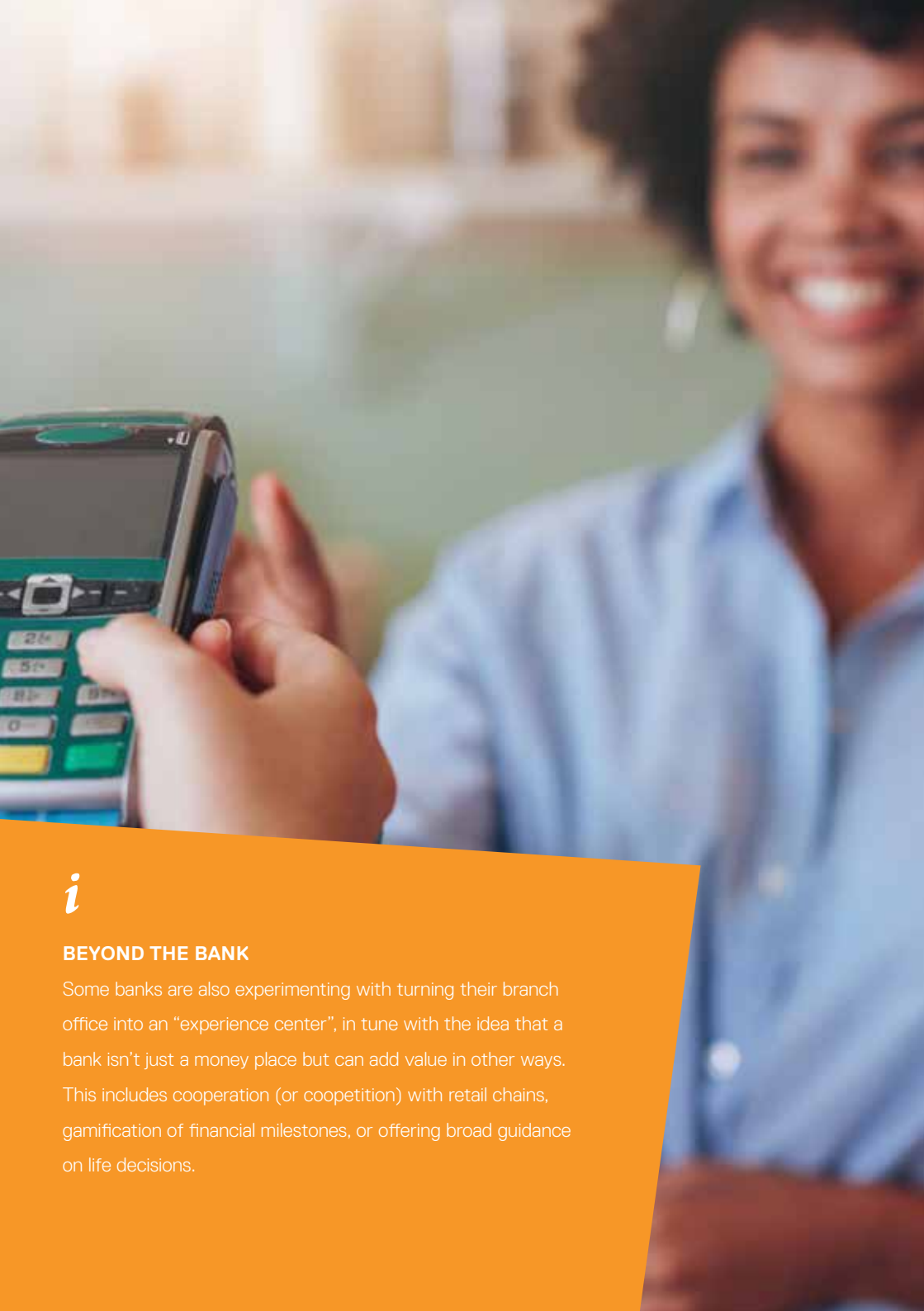
Here, IT can play a crucial role, too, in making the banking branch smarter. If the back office runs more smoothly, more automated and can yield better insights into customer profiles, bank employees will also be able to give better advice and **devote more face-time** to their customers.

# 33%

A STANDARD & POOR'S SURVEY IN 2014 FOUND THAT ONLY ONE IN THREE ADULTS WORLDWIDE IS FINANCIALLY LITERATE – A DRAMATIC SCORE. SCORES ARE HIGHEST IN THE DEVELOPED WORLD. THEY ARE THE LOWEST IN EMERGING COUNTRIES. RISK DIVERSIFICATION IS THE LEAST UNDERSTOOD CONCEPT AMONG THE 15,000 PEOPLE POLLED.

Source: Standard & Poor's





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## BEYOND THE BANK

Some banks are also experimenting with turning their branch office into an “experience center”, in tune with the idea that a bank isn’t just a money place but can add value in other ways. This includes cooperation (or cooptation) with retail chains, gamification of financial milestones, or offering broad guidance on life decisions.

## Increasing financial literacy

While it’s true that the average consumer is better-connected and more informed than the 20th century consumer, **financial literacy still isn’t widespread**. Banks can play their part in getting this score up.

A customer that makes more thoughtful decisions is a long-term investor.

A financially illiterate customer, on the other hand, is a liability. Their **vulnerability to bad decisions** might make them a ripe target for unscrupulous business, but their long-term ROI is poor.

IT infrastructures must be prepared to **reach out to this audience segment**. The financially illiterate are often young or have no use for long e-mails. Banking apps on **mobile devices** or **social media campaigns** are more likely to reach them.

There is no reason to let the underbanked go to new market entrants.

Banks have the **know-how and the expertise** on board to educate their customers. IT can play a crucial role in **connecting the experts** to the ones that need them most.

i DELLEMC

### THE THINK FORWARD INITIATIVE

Financial literacy matters. While defrauding the less-informed may be a short-term profit machine, banks profit much more from a long-term relationship where both the customer and the bank can thrive. The Think Forward Initiative was founded in this spirit: by bringing together a diverse range of experts in the field - e.g. from ING and Microsoft - it aims to improve financial literacy and make customers smarter with the aid of technology.

75% 

THREE-QUARTERS OF ALL BANK CUSTOMERS STILL PHYSICALLY VISIT THE BRANCH OFFICE TO OPEN A NEW ACCOUNT.

Source: Salesforce



## A CLOSER LOOK – DELL EMC CUSTOMER CASE

### CITIC BANK: THE TRANSFORMED BIRD CATCHES THE WORM

**1 The customer** - China CITIC Bank was one of the country's first commercial banks.

Nowadays, it is active in over 130 countries and regions in the world and issues over 140 million credit cards.

**2 The challenge** - While the domestic market for consumer credit in China is booming, CITIC Bank faced intense competition on its home turf. Its Bank Credit Card Center had to find ways to

- target specific customer profiles more accurately, and
- deliver campaigns within the shortest time margins.

With disparate systems designed for single applications as well as legacy storage methods, this was tricky and time-consuming.

**3 The solution** - China CITIC Bank chose Pivotal Greenplum Database over IBM DB2, Oracle 11g and Teradata 14 because it was the only solution built on open-platform, "shared-nothing", massively parallel processing (MPP) architecture. The new enterprise data warehouse supports operational, tactical and strategic business intelligence (BI) activities across the company. By design, it seamlessly integrates with CITIC Bank's existing systems.

**4 Benefits** - Since implementing Pivotal Greenplum Database, China CITIC Bank has:

- successfully conducted more than 1,286 marketing campaigns,
- reduced its average configuration time for each campaign by 86%
- streamlined its minimum delivery time - reducing it from two weeks to two or three days.

## Becoming see-through

Another field where technology can contribute is **transparency**. Financial institutions are **notoriously opaque**, and this isn't even always by design.

The result of organic mergers and patches creates a very complex structure. This is difficult even for a bank's insiders to get a good grasp on.

But where there can be a single source of information thanks to digital transformation, this **information can also be used and shared with customers**.

This could range from giving them **automated insights** into their own spending and saving habits to sharing overall finance and data trends with them. This makes your customers smarter and it gives the bank a more **transparent, outward-facing image**.

*"With a wider range of business data and a 50 percent increase in the system refresh rate, our users are spending 40 percent more time on data analysis, which makes a huge difference to our business. The credit card center has already gained up to 40 times the investment in Pivotal Greenplum Database, which is a significant achievement."*

Ming Zhang  
Vice president, China CITIC Bank  
Credit Card Center



### KEY TAKEAWAYS FROM THIS CHAPTER

Technology brings both risk and opportunity to the customer relationship

#### Risk

- Spam
- Privacy breaches
- Focusing on the wrong data

#### Opportunity

- Serving the hyper-connected customer
- Improving branch services
- Reaching out to the financially illiterate
- Using the data to provide insight

## CHAPTER 5

# Safe and sound

**According to analyst firm Gartner, security is the top concern for banks**

Banks have always had security among their first priorities. Bank robbers no longer arrive in fast getaway cars and come in guns blazing, but have become sophisticated hackers or defrauders.

But there are other security concerns, too. One of them is accountability to compliance rules and authorities. Another one comes from within: malice isn't even needed for an employee to cause damage to the banking system.

From these point of view, the case for transforming the IT setup is not driven by commercial logic, but existential logic.

# 64%



THE NUMBER OF BANKS THAT CITE SECURITY AS THEIR NUMBER ONE CONCERN.

Source: Gartner

## Stranger danger

Actively malicious threats include **hackers**, **thieves** and defrauders, as well as **unreliable insiders**. Countermeasures exist, but the threat gap is always there.

“The reality is we need to learn to take a risk-management approach to living with malware, frankly. That’s constantly monitoring it, constantly checking for it, **constantly staying on top** of how it’s evolving and doing our best to ensure that whatever malware is floating around and is injected into our enterprise is something that we can manage,” says Bill Wansley of Booz Allen Hamilton in BankInfoSecurity.

Banks often partner with IT firms or **IT alliances** to manage the cybersecurity component. The advantages are obvious: **24/7 uptime** and monitoring, **services from specialists** as well as threat detection algorithms that have been tried and tested in a wide range of contexts before.

**\$202 billion**

THE EXPECTED SIZE OF THE CYBERSECURITY MARKET BY 2021.

Source: Markets and Markets



**£500 million**

ANNUAL LOSSES ON CREDIT CARD FRAUD IN THE UNITED KINGDOM.

Source: BBC



## Compliance and regulation

Recent years have heightened compliance's profile, e.g. with **GDPR, PSD2 or Basel III**.

As with security threats through negligence or ignorance, it is often **not ill will** that is the problem for a financial service to comply with legal and industry regulations, but not knowing how to get it done with their current IT setups.

**Compliance processes must be built into the IT process.**

This avoids lots of manual work and, but mandates a transformation process that fosters this kind of automatic compliance. It can be **part of a larger transformation effort, or even the main driver** to arrive at the single source of truth.

**93%**

BANKS SUCH AS BARCLAYS, HSBC, LLOYDS AND SANTANDER REPORT AS MANY AS 93% OF ALL SECURITY LEAKS ARE DUE TO SIMPLE HUMAN ERRORS.

Source: ITProPortal



**top 5**

AMERICAN BANKING CIOs REFERRED TO KEEPING UP WITH REGULATION AND COMPLIANCE AS ONE OF THEIR TOP FIVE CHALLENGES. 12% LISTS IT AS THEIR NUMBER ONE PRIORITY.

Source: American Banker

## So long and thanks for all the phish

Process optimizations and security expertise can only do so much. Governance also requires an **active effort on the part of the employees.**

Especially in banks, where the IT infrastructure is more or less the bank without its people, this responsibility is even more urgent.

Teach an employee not to get phished, and they'll never be phished again.

It's a bold statement, but the kernel of truth is there. **If IT can reach out to the bank's workforce** and teach **IT hygiene** (e.g. password strength, safe collaboration techniques or e-mail policies), risk can be mitigated significantly.

## i

### PREVENTING A PALACE COUP

User personas are as important as customer personas. Better security clearance and user segmentation within a financial organization is a key tactic in minimizing the risk of being exposed to risks from within. The trick is to set these permission and security levels so that they help people in their work (e.g. by removing unnecessary clutter from the dashboard) rather than adding an extra set of hoops to jump through.





## A CLOSER LOOK – DELL EMC CUSTOMER CASE

### MOVEMENT MORTGAGE MOVES FORWARD ON SECURITY

**1 The customer** - Movement Mortgage is an American mortgage provider founded in 2008. Hugely successful from the outset, the company ballooned from four to over 3,800 employees in under a decade.

**2 The challenge** - However, the company's IT department found it is a difficult challenge to keep an even pace with the business success. Faster and more reliable network capabilities were becoming a requirement for its increasingly mobile workforce. In addition, Movement Mortgage didn't have a unified security policy and its systems couldn't support one.

**3 The solution** - In addition to updating its hardware with nearly 4,000 Dell OptiPlex desktops, Dell tablets and Dell Latitude laptops

with superior network capabilities, Movement Mortgage also began using Dell EMC Networking and SonicWall technologies. This gave the company a better overview of data streams and made it possible to put in place one IT security strategy.

**4 Benefits** - The benefits to Movement Mortgage have been immediate and noticeable:

- ◆ employees can remotely and safely originate loans fast
- ◆ clearly visible traffic streams help detect attacks and threats much quicker
- ◆ employee growth of 27% could be comfortably supported

*“By getting all of our locations across 47 states under a consolidated single wide-area network using Dell EMC Networking, Aerohive and SonicWall technologies, I know where traffic originates. In case of a malicious attack, I can more easily pinpoint it, shut it down and lock it out.”*

Cam Lawler  
Enterprise Applications Director,  
Movement Mortgage



#### KEY TAKEAWAYS FROM THIS CHAPTER

Two main types of security risk exist

- ◆ Un- or badly protected data and infrastructure
- ◆ Failure to observe compliance

To mitigate risk, several strategies exist

- ◆ Threat detection and external expertise
- ◆ Automation of compliance procedures (through transformation)
- ◆ Better data governance
- ◆ User personas and clear access levels

## TO CONCLUDE

# Connected currency



### KEY TAKEAWAYS FROM THIS BOOKLET

Digital transformation offers opportunities for financial services to

- ◆ Get in on new technologies (e.g. blockchain) and channels (e.g. IoT)
- ◆ Create 360° customer views and hyper-segmentation
- ◆ Shore up security and compliance
- ◆ Improve the consumer experience

... and formulas exist to do it right

- ◆ Best practices from industry alliances
- ◆ Outsourcing to experts
- ◆ Cooperation and cooptition with new entrants

*“Financial services are one of the first movers in embracing technology to better serve our customers. [...] As one of the world’s biggest users of Dell EMC, we spend approximately \$9 billion a year on technology, including infrastructure as well as cloud computing, big data analytics and cybersecurity. We make sure we spend wisely and select our partners very carefully. [...] I’ve known Michael Dell for 30 years. I’m thrilled for [him] and the new company, and we are eager to see everything they create in the future.”*

Jamie Dimon  
Chairman and CEO of JPMorgan Chase



## ABOUT DELL EMC

Dell EMC for the financial services sector solutions offer **pragmatic innovation** to the finance sector's current and future needs. Today's financial services are caught in a perfect storm of technology disruption, intensifying competition and customer volatility. Dell EMC and its alliance partners are well-positioned to offer banks and finance institutes the chance to turn these challenges into opportunities.

Together, we identify and analyse your needs, and help implement a solution that is specifically tailored to transform your IT and **close the gap between business and technology**. We have the necessary know-how to connect you with all the technologies that you need to come out on top, both within and outside of your organization. We want to be **your partner all the way** from the earliest brainstorm session to the last request for service, years after we have deployed our solutions at your bank.

### Let Dell EMC help realize your digital transformation

By helping you on your road to **digital transformation**, we also want to help you offer the very best in financial services to your customers. We achieve this by **streamlining** and **automating** routine processes, by enhancing your **analytics** powers to better leverage your data, and by bolstering your **security** so that your customers know their assets are in safe hands.

In a transformed IT setup, information flows freely from and to **one single source of truth**. This makes facts more reliable and strategies more measurable. We can also help you derive value from the latest technology innovations, such as **blockchain** and **IoT**.

All of this also frees your employees to start innovating and spend more time sharing their financial expertise with your customers. Our leadership can be seen in some of the biggest and largest growth categories in the IT infrastructure business — converged infrastructure, storage, virtualized data centers, secure laptops, cloud infrastructure and virtualization.

### So where technology is concerned, we're clearly playing to win

**Dell EMC**, a part of **Dell Technologies**, enables organizations to modernize, automate and transform their **data center** using industry-leading **converged infrastructure**, servers, **storage** and data protection technologies. This provides a trusted foundation for businesses to transform IT, through the creation of a **hybrid cloud**, and transform their business through the creation of cloud-native applications and **big data** solutions. Dell EMC services its customers – including 98 percent of the Fortune 500 – with the industry's broadest, most innovative infrastructure portfolio from edge to core to cloud.

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