Tomorrow's World:

How Will AI Transform Banking?

– A Report by SAS Banking Experts

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1: Executive Summary

Artificial intelligence has huge potential in banking. From the use of machine learning to support investment strategies, through to face recognition software used to improve the experience of bank customers, much is possible. Realistically, perhaps the biggest potential lies in partnerships between humans and machines, with each augmenting the shortcomings of the other.

The real question, however, is whether banks will take up the opportunities offered, or allow new fintechs to step into the space. This may come down to a question of readiness.

Understanding the picture

During the summer of 2017, SAS subject matter experts carried out a series of interviews with executives from businesses across the Europe, Middle East and Africa region. Respondents included 19 banking executives. The aim was to explore the state of readiness to exploit AI in these organisations, and there were some interesting differences between banks and others.

Banking respondents, for example, saw data mining and predictive analytics as key areas for AI use. They also expected to see an impact within 5 years. In particular, banking respondents mentioned the use of chatbots, perhaps because of the rapid rise of internet and phone banking over the last decade. They also expected to be using AI in fraud prevention, and many of the projects in the pipeline were therefore focused on text or sentiment analysis. Unsurprisingly, their concerns focused on the impact of regulation, and particularly late legislative change, on the potential to exploit AI. The overall picture in the sector was one of wary acceptance of AI, with care being taken to be left behind, or to move too fast and get caught out by regulatory changes.

Filling out the detail

It is not surprising that banks are interested in the potential of chatbots. Banks still receive huge volumes of calls and personal contacts from customers. Improving the efficiency of these interactions could rapidly reduce costs, as well as improving customer experience. The technology, however, is still a bit limited. Several banks and financial organisations have plans for chatbots with very specific functions, but none, as yet, have come up with anything that can replace humans for more general interactions. Data scientists are also essential to train and manage chatbots, which may prove to be the limiting factor.

Other technologies are also having an impact on banking, such as the use of geolocation. At its simplest, geolocation allows customers to find their nearest bank branch or ATM from the location of their phone. It also allows banks to check customer location against card transactions, reducing both fraud and the embarrassment of declined cards. In the future, when geolocation technology is combined with AI, banks may even find themselves extending credit to customers visiting particular shops, such as designer outlets. They could also offer insurance to those who make expensive purchases, all in real time. Customers want change, and banks will need to move with their customers if they wish to retain the business.

Although there is agreement that there is potential for banks to use chatbots and geolocation, there is also a sense that this remains challenging at present. However, banks are already using AI in other ways through 'smart machines' such as ATMs that use neural networks to predict demand and resupply requirements. Increasingly, banks and other organisations are also seeing the importance of integrating risk and finance. This enables different ways of thinking about credit risk, and brings more information together. Profitability analysis is also providing benefits for banks and fintechs alike, although the real question is not so much how to identify the most profitable products or customers, but what to do with the insight once gained.

One of the limiting factors in using AI and analytics is being able to access suitable talent. While the talent pool is undoubtedly relatively small, a number of banks have recognised that hackathons may provide an answer. Not only can they act as extended interview processes, but they also offer a way to innovate without the need to recruit. Thinking 'outside the box' is proving once again to be key to success.

An eye to the future

There is no question that change is coming. It is both faster and slower than expected: there is a lot of hype about AI, but fewer actual use cases, especially in financial services. Few would argue, however, with the conclusion that banks need AI. This is likely to be particularly important to handle the increasingly large volumes of data about customers and their transactions, and remain compliant with new regulations about data handling and protection.

Where will AI take banking in the future? There are already signs of how operating and business models may change. Regulatory changes such as the EU's revised Payments Services Directive will also have an impact by opening up the market. Perhaps the biggest question mark hangs over the ethical use of AI: how will banks use it responsibly and wisely? This seems likely to involve partnerships between humans and machines, with both becoming more effective as a result. Whatever happens, the future will certainly be interesting.

2: AI in banking: the challenge and the opportunity

Bank customers are becoming more and more demanding. In the age of Google, Apple, Facebook and Amazon, we have become accustomed to personalised offers building on data that we have voluntarily provided. As a result, the first banks have already expanded on the AI system used by Alexa, to produce finance-specific answers for customers who want Alexa to run their investment strategy.

The rise of machine learning algorithms

Behind this development are machine learning algorithms, which are able to model the characteristics of the people concerned and predict their preferred investment behaviour and interests. While these algorithms can learn, the "machine" element does not make them self-sufficient and self-sustaining. They must be fed the right models at the right intervals by a human being, in this case a data scientist.

This is by no means the only use of AI and analytics in banks. One of the most common uses is in managing unstructured data, including emails, news articles, excerpts from the commercial register and recorded telephone conversations. Analysing these data does not necessarily require AI; the first challenge is to be able to apply analytics at all. AI, however, certainly gives the best chance of processing this information intelligently.

AI also has potential to make banks smarter. For example, it could be used to learn how markets behave, through deeper insights into the behaviour of the market participants, enabling better risk assessments. Modelling human behaviour – complex, emotional and influenced by a wide range of inputs – can also help bankers. An AI system that has learned the behaviour of a trader and its effects on performance over time may help to prevent that trader from making unsuccessful decisions based on 'gut feeling'.

However, it is also conceivable that machines themselves learn by "observing" successful human action over a period of time and then modelling it mathematically. Again, this is likely to need a data scientist to develop the correct mathematical model and manage its adjustment over time, building a long-term partnership of mutual learning and adjustment.

AI also makes the bank smarter than its customers, so that it can offer more useful services. This can happen in several ways. AI can aggregate all information about a customer, so that it 'knows' the customer, and can tailor its interactions. It is also conceivable that Apple's face recognition software could play a role. The bank branch of the future may 'recognise' customers as they are walking in through the door, so that the consultant who greets them already knows about them.

> AI can aggregate all information about a customer, so that it 'knows' the customer, and can tailor its interactions.

Some are sceptical: one analyst recently commented: "What good is knowledge about a customer at the entrance, if the consultant is getting a coffee at the time?" There are, clearly, issues about the efficient operationalisation of the knowledge gained from AI.

AI in credit scoring

In 1970, Irish banks closed for six months because of a strike. There was, relatively quickly, a shortage of cash. But the economy did not grind to a halt; far from it. Instead, people began to exchange cheques and other instruments in the pubs and stores, creating a kind of alternative currency. They could only do this because there was mutual trust in the local economies, and because within communities, everyone knew who had exchanged what and who was trustworthy.

In other words, reputation mattered, and turns out to be crucial in credit scoring of any kind. It is already possible to obtain relevant information from data that people have generated online, for example, social media posts, browser behaviour, phone calls or online payment histories. This enables people to build reputations in regional or global communities. This data use may seem a touch obtrusive, but for people in emerging markets or developing countries who do not have access to traditional banking, it may be the only way to build a reputation and a credit history.

> With robotic process automation(RPA) and AI, the financial world now has a way to give employees the freedom to start this cultural change.

AI as a weapon in the fight for survival

Since the global economic crisis in 2008 and regulations from Basel to Sarbanes-Oxley, cost pressures have been accumulating on banks, and have created enormous potential for disruption. Now the question is whether the worm will turn, or if fintechs will become market leaders. Today, fintechs and banks are predominantly complementary. It remains to be seen how quickly the big players will realise the opportunities of digitalisation – that is, not simply replacing analogue processes with digital, but discovering completely new potential in datasets and AI.

The biggest challenge is probably cultural. AI needs a 'fail fast' approach, but banks still find it hard to accept failure. With robotic process automation (RPA) and AI, the financial world now has a way to give employees the freedom to start this cultural change. Go on, dare to take that first step.

3: Findings from the survey

During the summer of 2017, SAS subject matter experts interviewed 100 business leaders across EMEA to understand the progress within organisations towards AI. Among the respondents were 19 banks. Together with insurance respondents, the financial sector represented about a third of the survey. Responses from the financial sector were, in several cases, in line with overall trends, but there were also some key differences in responses both from financial services as a whole, and from banks.

Similarities and differences

Similar challenges were identified across all sectors in deploying AI. Levels of optimism – or lack of it, when discussing organisational readiness – were also similar across all sectors, although slightly lower in banking.

However, there were also some key differences among financial services companies. Respondents from this sector were more likely to mention machine learning and deep learning, automation of business transactions, and systems that could imitate human intelligence in their definitions of AI. However, even within the financial sector, there were some key differences between banking and insurance respondents, with different pictures emerging of the use of AI.

In their definitions of AI, a larger proportion of respondents from the banking sector than from the overall group mentioned both predictive and prescriptive analytics and data mining. Banking respondents also expected to see a rapid or exponential impact from AI, within less than five years. Respondents from banking, far more than other groups, anticipated seeing a greater impact from AI on financial services. This may be a question of having a better understanding of the potential for disruption, or perhaps being aware of the earlier effect of internet banking on traditional models.

Respondents commented that financial services would be affected because the requirement for knowledge, and the repeatability of actions made the sector an ideal opportunity for AI use. Some concerns were expressed about jobs, but many respondents were sanguine: they recognised that some jobs would change or cease to exist, but expected new ones to emerge as well.

Learning from experience

It may be an inevitable result of the changes to banking over recent decades, including phone and internet banking, that banks see chatbots as one of the most likely future uses of AI. The banking respondents also expected to see early use of AI to predict likely customer behaviour, which is key to prevention of fraud. They were likely to have plans or projects in the pipeline focused on text and sentiment analysis. They were also more likely than either financial services as a whole, or the overall group, to be working on security improvements or blockchain apps.

Banks were more alert to the potential for slow or late legislative change to affect their use of AI. In a highly regulated environment, sensitivity to the time span of legislation is probably inevitable, and concerns centred around governance and data privacy. This may explain both the slower rate of adoption, and higher levels of interest in particular areas: effective lobbying requires clear understanding of what you want to achieve and why.

Organisational drivers and business cases

Financial services organisations were more likely than average to have adopted one of the two main models of organisational driver of AI: a central unit or business unit initiatives. Banks were split fairly evenly between the two models. Where banks parted company from both insurance firms and other sectors was in business case assessment. Although banks were more likely than insurance firms to declare that there was no difference between assessment of AI business cases and others, they also recognised that it was harder to measure the ROI on AI projects.

The cost of deployment and difficulty of measuring ROI was identified as a key challenge for AI deployment in banks. Banking respondents were also more likely to mention cultural challenges, and trusting the AI 'black box', which may reflect banking's more data-driven approach more generally.

Getting prepared

Banks were more likely to say that they were building or training up their data science team as a way to improve readiness. There were similar concerns about readiness in the financial sector and the overall group. Fewer financial services firms already had a cloud solution in place, but many said that they envisaged using a cloud solution in future, especially among the banks.

Overall, the general picture in the banking sector is one of wary acceptance. They are moving slightly more slowly than the average, but this seems to be because they are being more careful to understand and address the challenges. They have no intention of being left behind, but in a highly regulated environment, must be careful how they move.

See Main AI report

4: How chatbots are changing customer service dynamics in banking

It is perhaps unsurprising that many banking respondents mentioned the potential of chatbots. Chatbots offer huge opportunities for banks across three broad dimensions.

Efficiency and opportunity

The most expensive forms of interaction with customers are the personal ones: face-to-face, and by telephone. This explains why banks have encouraged customers to adopt internet banking. But it also explains why banks are looking so hard at chatbots: reduce the price of telephone interaction by using bots, and you have made some serious efficiencies. But of course to succeed, the chatbots have to be effective.

A number of chatbots are already in the pipeline for specific purposes. MasterCard and Bank of America both have plans for chatbots that can provide answers to specific (and relatively simple) questions, such as providing details of the last transaction, and even giving some basic financial advice. Both will use Facebook Messenger, and Western Union has also announced plans for a chatbot to allow customers to send money via Messenger.

Banking apps are not always the most user-friendly, and chatbots offer the opportunity to improve user experience, and make banking easier. Getting chatbots right could turn out to be the key to attracting and retaining customers. Investment in data science input is likely to be very worthwhile. Chatbots could indeed be the new competitive frontier in banking.

Design considerations

Chatbots that are really useful for customer services are quite hard to create. There are two main types of chatbots: those that have a limited number of options for response, and so control the conversation, and those that do not control the conversation. The first is essentially a talking web form, like those described before. The second is required to take customer service interactions with bots to the next level. Unfortunately, it is also much harder to create, because it is impossible to code for every option.

The list of requirements for chatbots is deceptively simple. They need natural language processing, and the ability to engage with a particular context, use real-time data, cite written materials when appropriate, and work across channels. They also need deep knowledge that can only be supplied by correct use of data. Finally, they must be able to learn over time, and anticipate customer needs.

Machine learning may be the way to create chatbots that can interact with customers without controlling the conversation, learn from experience, and anticipate needs. These chatbots would either divert questions to a human operator and 'watch' the human response, learning from it for next time, or be taught by human operators based on selected real interactions.

But careful design is crucial to getting it right. We probably all know the cautionary tale of Alexa ordering dolls-houses. When chatbots go wrong, it can be spectacular and messy. It is therefore essential to build in safeguards, such as allowing people to divert from the chatbot to a human when they wish, and flagging phrases that might expose the bank to fraud. Limiting the options and keeping it simple are also both good ways to improve customer interactions.

Humans as the limiting factor

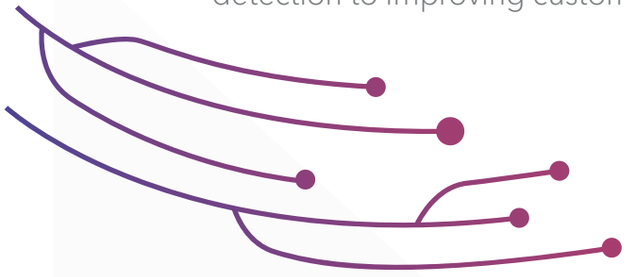
Research suggests humans are interested and willing to engage with chatbots. In one study using a new chatbot, huge numbers of people asked for more suggested commands, but very few actually tried any commands outside those suggested. This means that developers need to think about how to encourage users to experiment with commands.

All these issues add up to data scientists being essential in building deep learning algorithms and creating better banking chatbots. They play a vital role supplying the right information, including real-time data to enable the chatbot to understand, for example, why customers may have called, or when the bank is at risk of losing a customer. Data scientists are essential to chatbot development.

The relationship between chatbots and data scientists can be two-way. Data scientists support chatbots by supplying suitable sources of information, and making sure that the bot is calling on useful data. But data from chatbot interactions can also support other data science and analytics projects, meaning that there is a real incentive for data scientists to engage.

5: A sense of place: using geolocation to transform banking

Geolocation is the use of technology to identify the real-world location of an object or a person. Global positioning systems are an example of geolocation, as is the use of mobile phone signals to identify a phone's location – a system which has been crucial in a number of criminal trials. Geolocation technology is now also starting to change the face of banking, with applications ranging from fraud detection to improving customer service.



A changing context

We all know that banking and financial services are changing. We see it every day in the way that we access services: we do our banking online, often on mobile and on the go. We want to be able to check our balance before buying, take out loans rapidly and easily, and access everything on demand. We also want more personalisation in our banking services: a better understanding of us as individuals, and services and products to meet our needs.

At the same time, banks are facing increasing competition from online-only financial technology start-ups. Struggling to maintain revenues, many have closed bank branches, making us turn even more to mobile and online services. This might sound promising, but despite the competition from fintechs, many banks are still trying to stick with the same old services, just provided online rather than face-to-face in a branch. As a result, they are losing customers to fintechs with a better understanding of customer wants and needs, and a willingness to supply financial services more flexibly.

New services and products

Consider the new services now available to consumers from fintechs. Customers can now pay for goods using mobile phones, via Apple Pay and Samsung Pay. These systems allow customers to maintain a virtual wallet of both payment and loyalty cards, without having to carry more than a smartphone.

More simply, geolocation enables customers to find their nearest ATM or bank branch, together with directions to get there, making it easier to use bank services. Smartphones and geolocation are also being used to give potential customers access to relevant offers as they walk down the road. The shops in London's Regent Street, for example, use beacon technology to target customers with specific offers outside particular shops. It's surely only a matter of time before fintechs get in on the act, and customers pausing outside designer goods' shops are offered credit lines, with those who buy expensive items being sent proposals for new insurance products.

Behavioural analytics offers the potential for banks and financial services providers to hold a personal data dashboard for each customer. This would show what they typically spend on particular items or classes of goods, including food, leisure, and fashion. It would also show when they are most likely to buy, and therefore help retailers to target offers more appropriately. Their bank could get in on the act by offering access to credit at the most suitable moment. Of course banks and retailers will need to spend time making sure that these offers are appropriate and ethical, rather than tempting people to spend money they don't have, but the potential is enormous.

The benefits to banks and merchants go well beyond extending credit. US Bank, for example, is already using smartphone geolocation to check customers' locations against card transactions, reducing both fraud and the potential embarrassment of declining a card unnecessarily. These benefits, however, have to be balanced against the serious risks

of new entrants getting in on the act, and the increased competition that results. Intermediation companies like Paypal and Apple Pay, which allow customers to create a virtual wallet or pay by methods that do not involve carrying cards, are reducing the need for direct banking services. And customers like the security of not carrying a card, but instead using a password to access payment.

Telcos are also starting to offer banking services, such as Orange Bank in France. Facebook and other popular apps are looking to exploit their ubiquity, and provide new services to their customers. These are likely to include financial services, drawing on the levels of trust that they have developed.

The bottom line

The bottom line is that customers' demand for instant access requires different ways of delivering services. If banks are prepared to move with their customers, then inertia is likely to ensure that they retain the majority of their existing clientele. If, however, they do not take advantage of technologies like geolocation, they are likely to lose out.

6: The increasing role machine learning plays in ATM forecasting

AI is not, however, only being used in new ways. It can also support more traditional banking practices, increasing efficiency and improving customer services, helping to overcome some important challenges.

Identifying challenges

Consider automated teller machines, or ATMs, otherwise known as cash machines. We have all experienced the situation that all the ATMs in a certain location have run out of money at the same time. It is annoying for customers to find empty ATMs, but it is also annoying for banks to miss out on customers, or to have the opposite situation, cash tied up in ATMs that is not being accessed.

This is where deep learning and AI can help, through the rise of 'smart machines', or machines into which AI capabilities have been embedded to enable them to perform some additional tasks. These machines include ATMs that can forecast demand more accurately, and assess the need to replenish.

The rise of smart cash machines

These smart ATMs use a particular type of deep learning called recurrent neural networks. They therefore learn by themselves, from the data they themselves generate. Recurrent neural networks are a very good way to model sequential data, like information about withdrawals from cash machines. They are also very good at forecasting, especially when demand is likely follow patterns. They are able to translate previous events into good forecasts of future demand. They do, however, need a lot of data to perform well: more data leads to better performance and increased levels of accuracy.

The demand for cash from a cash machine, for example, will depend on its location, and also the time of the day or week. A machine in or near a student union is likely to be heavily used on a Saturday night, and may be empty on Sunday if it cannot be refilled until Monday. A machine in a shopping street is more likely to be used steadily over the course of the week, with perhaps a peak in demand on Saturday morning.

> "The demand for cash from a cash machine, for example, will depend on its location, and also the time of the day or week."

Holiday periods may also affect demand, and will certainly affect replenishment. Recurrent neural networks use short- and long-term variations in demand to improve the accuracy of their forecasting, and predict the requirements for refilling the machines.

Smoothing out the peaks and troughs

It may not sound hard to predict that demand for cash will be high on a Saturday night in an area that is full of entertainment venues, or that Bank Holidays may mean extra cash has to be loaded into cash machines on Friday because the machine will not be refilled on Monday. But evening out the finer peaks and troughs in demand and supply is more difficult.

Banks want to make their cash work for them, which means getting it into the right place for their customers. Deep learning, and specifically recurrent neural networks, offer a way to do that by forecasting demand for cash from particular machines, and ensuring that it is there, ready. This also benefits the banks because it means their customers are happier: they have access to cash, and they are less likely to switch to another provider. In a world where customers are increasingly demanding, this matters.

7: The need for seamless risk and finance integration

In many ways financial services is about risk management. Regulatory pressures have hugely strengthened that focus. But there are other concerns too. Cost pressures are increasingly important, as is the rise of challengers to the status quo, including online-only providers and new entrants to the market, often more specialist and more targeted than the incumbents. Digital transformation and the drive towards online services, including the rise of the Internet of Things (IoT), is another challenge.

> New risk data architecture is needed to focus on the integration of time series data.

The driver for consolidating risk systems is often the integration of regulatory charges and a multidimensional view of risk. New risk data architecture is needed to focus on the integration of time series data. At the same time, finance and regulatory reporting is increasingly moving towards a model-free framework, and there is increased convergence between data and computing environments. This leads to a broader coverage of risk operations. Systems are increasingly open and exposed to third parties through prime brokerage and securities services divisions.

These internal consolidation strategies will drive initiatives

This has wide-ranging effects, for example on data management and technology. Closer integration of risk and finance means that banks will be looking for an advanced framework that integrates, validates and transforms multiple data feeds from several sources. Regulations require banks to implement a comprehensive data model that integrates the components of risk systems. This can potentially also capture the risk factor data sets. A consolidated P&L platform can bring together pricing, valuations and a framework for explaining and simulating the P&L. This single, consolidated platform will be focused on risk and performance analytics based on enterprise reference data.

This has knock-on effects for risk analytics, such as the use of Monte Carlo simulations. A powerful engine is needed, to simulate over 1000 risk factors using correlated random numbers. It must also be seamlessly integrated into the risk management process. Other requirements include economic capital calculations for proprietary option books of interest rates, foreign exchange, precious metals, and commodities, sensitivity analysis, scenario generation, exposure calculation, balance sheet optimisation, underwriting risk and behavioural analytics. These risk and finance analytics also require skilled resources back-testing models, calibrating and providing extensive risk data analysis.

What about disclosure, financial reporting and governance? Banks will want a common reporting architecture for internal and regulatory requirements, following a factory approach and having easy-to-customise features. Governance is a key aspect of the development, support and maintenance of risk applications for all business areas. The starting point from a business perspective, however, usually remains credit risk.

Credit is the foundation of a wide variety of applications

Credit analytics covers a number of sub-topics, including credit portfolio management, fraud analytics, and credit trading. Credit risk is therefore part of:

- Application processes with pricing, calculation of limits and credit portfolio management;
- Transaction processing, with fraud analytics and real-time credit checks;
- Enterprise risk, with risk aggregation and counterparty credit risk; and
- The finance department, through risk-aware accounting, product control, valuations and performance analytics.

What does this mean in practice? What does the changing face of credit look like? There are plenty of new institutions, such as fintechs, getting into the market space. This has led to increasing demand for real-time analytics and payments systems based on micro-transactions. This, in turn, creates demand for completely new types of analytics, leveraging new data.

Enabling better integration choices

It no longer makes sense to approach risk and finance individually. Closer integration of risk and finance creates the rocket fuel powering the transformation of credit risk. There will, of course, be plenty of challenges in the emerging risk and finance landscape, along with a number of new opportunities. There is likely to be more risk-aware finance, risk data increasingly used in finance and an expanded role for performance metrics, as well as the emergence of enterprise performance frameworks.

8: Is fintech really about profitability analytics?

Businesses have to make a profit. This is, if you will forgive the pun, the bottom line. It is the reason why businesses exist, and it is the most important, if not the only reason, why any business does anything. Profitability really is king.

Transforming the banking sector

Digital transformation to most is about the customer journey, about delighting customers and making sure they stay or return. There is, however, a deeper purpose to transformation, and to focusing on the customer journey, and that is profitability. The reason you want to keep customers coming back is because it is cheaper (and therefore more profitable) to keep an existing customer than to find a new one. But it is also no good delighting unprofitable customers. Those are the ones that you do not want to keep.

You therefore need to know which customers, and which products, are profitable for the business, which requires profitability analysis. Once you understand this, you can also use analytics to find out more about the characteristics of your profitable products and customers. You can then design more products that customers will be happy to pay for, and use digital methods to lower the costs of providing them. Win–win.

This sounds simple, but in practice it can be anything but. The range of stakeholders for profitability analysis is growing. The glib answer to the question 'who are the stakeholders?' is 'everyone'. The c-suite should certainly be interested, if not extremely focused. It is also true that those most likely to know how to make cost savings are those doing the work – and they are also likely to be those most affected by change. Finding suitable incentives to persuade them to engage with profitability analysis could therefore be quite challenging. Some companies have resorted to offering retraining for those who suggest how artificial intelligence could be used to do their job. Transparency may be key to achieving success, as it will help to reduce organisational barriers to change.

The stakeholder pool is also expanding outside the business itself. Product managers and those doing the work may have a strong interest. However, customers also have a vested interest in knowing that their banks understand where the money is coming from. A sustainable business model is important for ongoing stability, and most customers understand that since the 2008 financial crisis.

Improving profitability analysis

Like any other analysis, profitability analysis is only as good as the data going in. The volume of data available has therefore helped to improve it over the last few years, making it much more reliable.

Sadly, however, departmental silos may still be an issue, with some hiding behind regulations as reasons not to share data more widely. There is also still a lot of use of proxies, rather than actual measures. Credible third party data must also be integrated to get a more rounded and nuanced picture. This, in turn, will mean that new products can be better targeted and therefore more profitable.

> Real-time analysis in particular has had a strong impact.

Real-time analysis in particular has had a strong impact. It has improved response times, and enabled banks to react swiftly to customer activity and behaviour. The ability to provide 'next best offers' has been hugely helpful in driving profitability, and ensuring that customer offers are targeted and timely. This may in fact be the biggest difference between some of the fintech start-ups and the more traditional players in the banking sector.

Insight may not be enough…

Introducing profitability analysis, even in real-time, and drawing on all data available, may not be enough in itself. Even sharing the results around the organisation might not be sufficient. Insights are important, but stakeholders also need to understand what to do with them.

Taking action, and therefore responsibility, may be everyone's job, but it must surely start at the top. Where the c-suite leads, the business will eventually follow, provided that there is sufficient communication. It may be old-fashioned when talking about digital transformation, but good communication remains vital.

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9: Hackathons as a platform of innovation

Hackathons – short-term programming events using data, APIs and analytics to solve real-world problems – are great for team-building, recruitment, networking and experimenting. But there is a growing sense that they can also contribute to banking innovation and digitalisation, and help banks to tap into new uses of AI more effectively. There are a number of reasons for this.

The benefits of hackathons

Larger, older organisations, such as banks, tend to find innovation harder. The culture slips into maintenance mode, rather than innovation, and it can be hard to move away from that. Hackathons, like accelerators or incubators, allow banks to make contact with developers, and therefore introduce some innovative thinking. They also allow developers to understand rapidly whether their ideas will work, and enable banks to share APIs with developers and assess their usefulness and compatibility in solving real-world problems, such as splitting the bill in restaurants, or even disrupting the car rental market.

Sponsoring hackathons allows banks to ask developers to focus on particular areas. For example, MasterCard and U.S. Bank sponsored a hackathon in 2016 around innovative products for small businesses. Societe Generale has sponsored several hackathons around the future of banking, including one in 2017 in Prague, with the broad subject of a bank of the future you can count on, wherever you are. This kind of theme shapes, but does not confine, innovation.

One of the benefits of having multiple groups attending is that banks can cherry pick the best bits from each solution, and also tap into scarce talent like data scientists or analysts.

Sending the right signals

It is a moot point whether hackathons really give banks a serious return on investment. But whether or not any products emerge, hackathons are very effective marketing vehicles. They give big tech investors and developers the signal that the banks' APIs are open for business, and invite further activity.

Internal hackathons offer a way to bypass standard product development processes, and generate a more innovative culture, even if only for 24 hours. They bring together teams from across the business, including IT, customer service, and business units. These events encourage small teams to try a more agile way of working in a safe environment, where experimentation is encouraged and failure is tolerated. Like innovation labs, this offers a separation between innovation and business as usual that can enable diverse ways of working. Hackathons, especially internal ones, can also generate a lot of momentum among participants. If harnessed effectively, that momentum can help to change the culture and make it more innovative and agile.

Hackathons, in other words, offer a lot of benefits for banks and other financial sector organisations. They can help to increase innovation, and enable access to new technology and new ways of using it, without having to engage consultants or recruit new talent. It is not surprising that many banks have seen them as useful resources.

10: Making the case

Self-driving cars on our streets, Siri in our pockets, Alexa in the living room ... artificial intelligence and the machine-learning processes behind it are already in use today.

AI is partly embedded in our everyday life, and partly still has a "wow" factor about it, for example when we hear that the human 'driver' of a Tesla self-driving sports car in Florida died in a collision with a truck that the car's autopilot system failed to spot.

But where is AI being used in banks? Robotic process automation, for example, is replacing processes behind the scenes in several banks. The time- and cost-pressure in this industry is high, and not just because of the ongoing global financial crisis and the regulations that have followed. New market entrants are also making life more difficult for traditional houses. Their models are bank-like, but they are able to offer more favourable international transfers and bring bank transactions to smartphones. These young financial firms are challenging the big money bureaus in their most lucrative areas of business.

Practical questions

This report has set out a number of existing and potential use cases for AI. Many banks are already starting to use this technology, and others are watching with interest. There are, however, still many questions. Will using chatbots be compliant with regulations? Could AI be helpful when selecting an investment strategy for securities? Will machine learning systems be acceptable to customers and staff? Critically, many banks have recognised the need to put data in the cloud and to keep the cost of the production of AI models under control.

What is now holding up the hype around AI, which is also being pushed by numerous advertising videos and on YouTube? According to various press reports, Watson, the alleged AI leader, recently became

the first program to take part in a state tender for the fight against cyber-terrorists in Italy. However, a report in the US caused concern that Watson was overburdened with the evaluation of cancer data, and it all went a bit quiet. Perhaps we are still not quite confident in using AI routinely.

Many people have high hopes for AI, including in risk management and banking more widely. The key, however, is likely to be the generation of measurable benefits, which so far has not been seen.

Generating measurable benefits

AI is likely to generate some significant benefits in banking over the next few years, but where are these benefits most likely to accrue? In the ERP environment, simple processes will be replaced by thinking machines, because they are able to simulate and automate an empirical treatment of financial documents, such as the use of the correct

> High-performance and intelligent automation, which must also be fully digitalised, is required.

booking rate on the basis of tax-relevant documents. Machines can already take over many of the small core tasks of traditional banking, and are often more reliable and accurate than a human being. Machine learning procedures also score highly when it comes to a model with closely connected attributes and huge quantities.

One reason for this is the way in which AI-enabled systems deal with data. High-performance and intelligent automation, which must also be fully digitalised, is required. Most routine processes in a bank require a large amount of data, and the banks have to be able to process this information efficiently, because of the complex intertwined regulations of banking supervision and customer-specific conditions and constraints.

An essential requirement?

As if this were not challenging enough, the sheer quantity of data to be processed is exploding. At the same time, the legislation on data protection and how we process it is changing, with the introduction of the EU's General Data Protection Regulation. There is very little question that banks need AI solutions, if only to be able to make effective use of unstructured data, and gain insights from it.

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11: The longer view

The SAS survey has provided valuable information about what is actually happening in the real world in relation to AI and advanced analytics, including in banking. It can, however, also be helpful to look ahead, and try to predict what is likely to emerge in the banking area in the next year or so, including in AI.

All the signs point to the coming 12 months being characterised by the usual 'evolution not revolution'. The overall course of the banking industry was largely set some years ago, and is characterised by the drive to digital transformation in an era of macroprudential regulation. There is, therefore little either on or over the horizon which is going to act as a seismic force. There will, of course, be disturbances and distractions as the year unfolds, but we are unlikely to see any major disruptions. With this in mind, it is therefore possible to predict some likely trends for the next 12 months.

> All the signs point to the coming 12 months being characterised by the usual 'evolution not revolution'.

Digit(al)isation of corporate banking

Corporate banks are likely to move fully to digital, as the general murmurings of dissatisfaction among national and multinational companies prove impossible to ignore. There has already been some digitisation of the back office (e.g. cash management), but in 2018, progress will extend through the middle office, where new banking products are created, and into the front, to allow relationship managers to use digital tools to make their job easier and their client(s) happier.

Further moves towards a platform economy

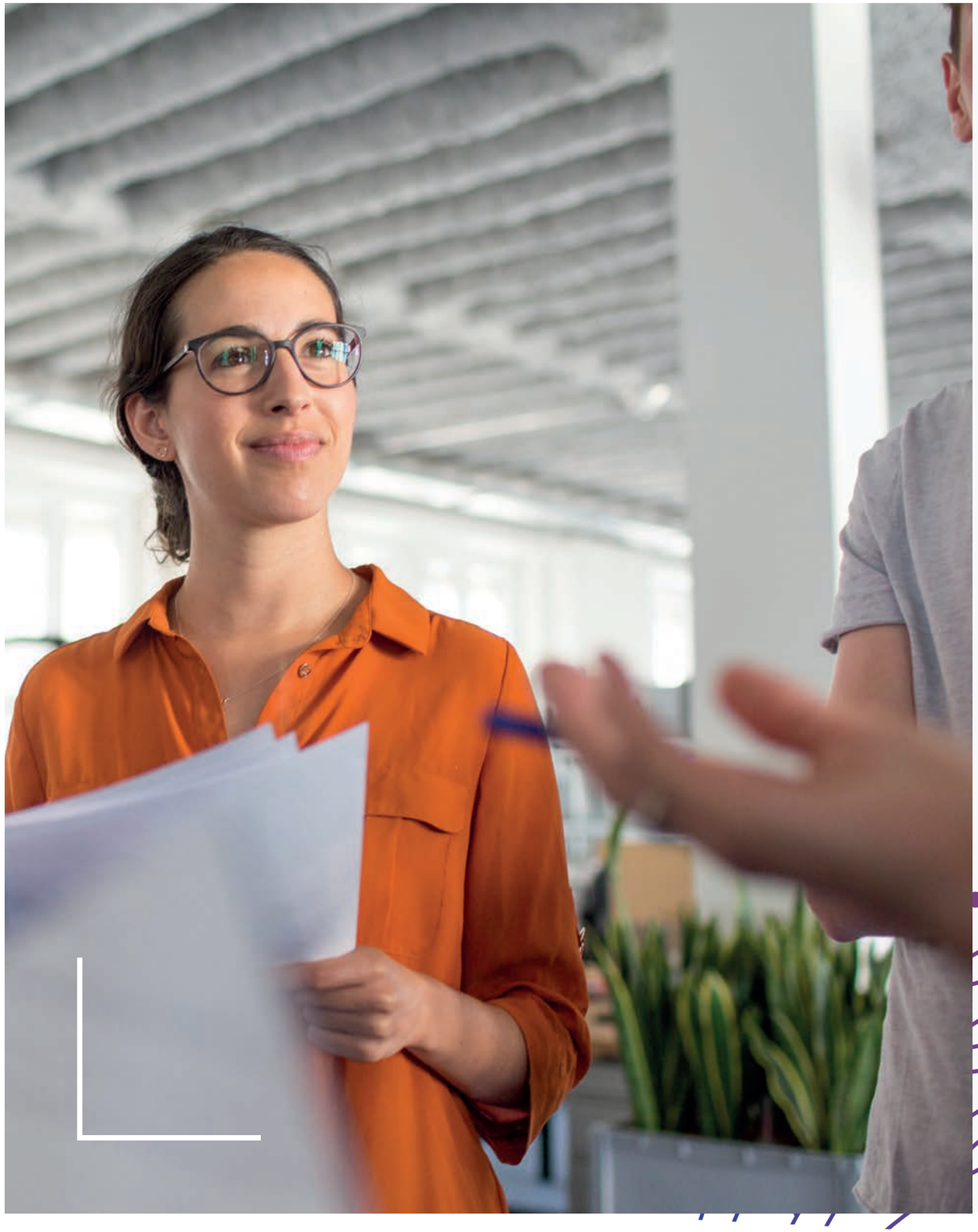
The move towards platforms is one of the most significant developments in banking. Forbes describes this as "the bundling together of multiple services onto one online platform,… [that] provides an efficient, automated and integrated customer experience". Those three outcomes are highly desirable for banks, as they drive improved financial and operational performance. The move towards platforms also puts banks on a similar plane to other industry sectors, although we unlikely to see the emergence of "the Amazon of banking" just yet.

Technology innovation boosts financial inclusion

Connecting – and reconnecting – people to the financial system remains a priority in 2018. Improvements have been made in recent years to close the gap between those who can gain access to banking services and those who can't, but progress needs to accelerate. This will, however, be challenging, as it requires close working from national governments, financial service providers, telcos and technology vendors.

Growth of fintech and regtech in emerging markets

During the last quarter of 2017, there has been ample evidence that fintechs and regtechs are beginning to proliferate in emerging markets. This will continue during the next 12 months and beyond, with new firms entering the market. This trend is closely linked to improving levels of financial inclusiveness, and may lead to major changes in the market in future.



Understanding EU-wide stress tests in an era of IFRS 9

The latest round of EU-wide stress testing starts in January, although the results will not be available until November. This is the first assessment in the era of IFRS 9, the standard specifying how an entity should classify and measure its financial assets, financial liabilities, and some contracts to buy or sell non-financial items. It may therefore provide some interesting surprises for at least a few firms.

Blockchain in lending and trade finance

Blockchain was one of the buzzwords of 2017, with cryptocurrencies finally reaching the mainstream. However, blockchain technology also has potential in several other areas, and commentators have been predicting its wider use for some years. Lending and trade finance are two obvious areas where blockchain could disturb the status quo by reducing the need for paper-based processes. Blockchain analytics may also be interesting.

Extension of open banking standard(s)

Within the more advanced economies, the concept of open banking – where banks move to become marketplaces for financial services – has taken the industry by storm. To weather a storm, you need an umbrella. In this instance, the umbrella is an open banking standard, which uniformly prescribes the steps required. Developments such as PSD2 have hastened standardisation, but there is still a huge amount of scope for further improvement. In Europe, a collaborative effort is being made by AIB Group, Bank of Ireland, Barclays, Danske, HSBC Group, Lloyds Banking Group, Nationwide, RBS Group and Santander to create an open API standard. More 'groupthink' examples are likely to emerge during the year.

Beginning the preparations for regulatory adjustments

2018 will witness some major regulatory developments, including PSD2 and GDPR in Europe, and Basel IV globally. The rollback of Dodd-Frank will hit US banks hardest, but the ripples from this development are likely to spread across the Atlantic to Europe as well. Ongoing success will hinge on good preparation.

M&A activity is back on the agenda in the search for growth

Several EMEA banks have recently installed new CEOs, and they are sure to be seeking ways to deliver sustainable revenue growth to keep their shareholders happy. This will stimulate renewed interest in M&A activity, and while the era of the mega-merger is behind us, 2018 may see some unlikely unions. A number of Chinese companies are sitting on huge cash piles, so there may be some strategic investments forthcoming.

> Ongoing success will hinge on good preparation.

AI fever takes hold, but some banks will lose their grip on reality

As the 2017 survey showed, AI is starting to take hold. It seems likely that AI and its associates, machine learning and deep learning, will transform not just banking but the wider world. However, it needs to be handled carefully. In particular, it is important to strike the right balance between humans and computers. The ethics of AI use, and finding this balance point, may turn out to be one of the most important elements of 2018.

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