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ARE FULLY AUTONOMOUS M2M SOLUTIONS THE NEXT REVOLUTION IN PAYMENTS?

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SUMMARY

The Internet of Things (IoT), its fast expansion and adoption, and the convergence with payments solutions, artificial intelligence (AI) and other disruptive technologies such as blockchain, lay the foundation for enhanced interactions between machines that would no longer require human intervention.

Machine-to-machine (M2M) payments are starting to gain traction and have enormous potential to simplify our lives. However, despite their theoretical potential, M2M solutions powered by AI and blockchain still need to mature, as important aspects require to be addressed.

In this paper, we look at the opportunities and challenges of M2M payments, and what market players should be considering to build and operate a secure, trustworthy payments ecosystem for mass-market adoption.

> *"Checks, cash or physical payment cards are no longer a 'thing' in the Internet of Things."*

THE PROLIFERATION OF IOT DEVICES AND MACHINE-TO-MACHINE SOLUTIONS

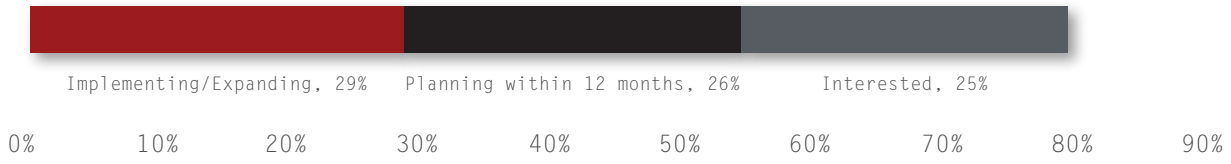
We use many smart devices every day. They are all around us, even if we don't realize it, and they're transforming our lives. The use-cases for these devices are endless - smart watches, speakers, fitness trackers, buttons, voice assistants, door locks, TVs, home appliances - the list goes on. All of these smart machines belong to the family of Internet of Things, an ever-growing world of interconnected devices and sensors that promise to make our lives easier, more efficient and convenient.

The telecommunications company Ericsson expects that by 2022 there will be 29 billion devices connected to the internet[1]. Compared to other prognoses, this number is rather on the conservative side. Statista.com expects over 42 billion of connected devices by 2022 and 75 billion by 2025[2]. Many of these devices support the purchasing of goods and services, leveraging payment information stored in the user's digital wallet. A smart fridge suggesting stocking up on milk is probably one of the more dated examples. Trendier instances include the ordering of products using a voice assistant, as well as IoT specialty areas such as manufacturing (a.k.a. industry 4.0) and agriculture.

According to a survey conducted by Forrester in 2017, 55 percent of large enterprises and small to medium business (SMBs) across all industry segments are either using IoT and machine-to-machine solutions already or are planning to do so within the next year, with a further 25 percent interested in exploring them[3]. Financial services and insurance companies, for example, are considering IoT and M2M solutions for intelligent customer services and fleet management[3].

A steadily increasing number of IoT consumer devices can leverage payment information to make purchases on our behalf, such as the automatic reordering of laundry detergent, as the predetermined restock cycle comes up. In most cases, the human is still involved to confirm transactions suggested by a device, though this is beginning to change, as fully autonomous M2M transactions and IoT payments are entering the stage. In the following sections, we explain the idea behind M2M payments and explore how close we are to a widespread rollout.

PLANS TO ADOPT IOT AND M2M SOLUTIONS BY LARGE ENTERPRISES AND SMBS



Source: Forrester Data Global Business Technographics® Networks and Telecommunications Survey, 2017

M2M PAYMENTS

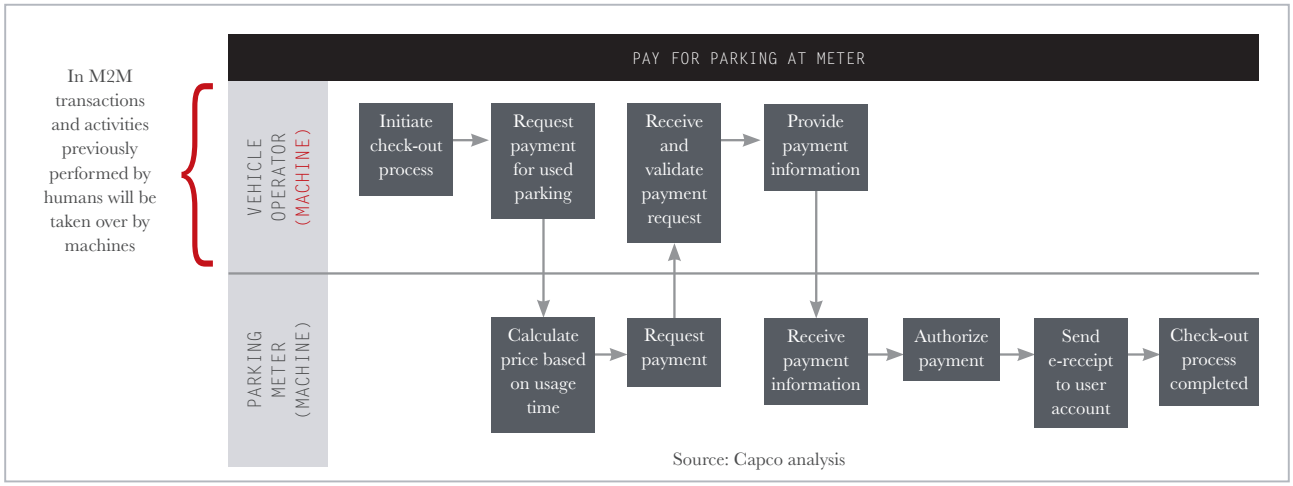
M2M transactions are often, incorrectly, used interchangeably with the IoT. While interconnected, the two are different in nature. Whereas IoT describes the world of interconnected things, M2M essentially describes the communication between machines without human intervention. M2M is enabled by the IoT through its connectivity and interoperability capabilities for message and data exchange. While M2M is not a new concept, the introduction of M2M capabilities and their usage in IoT devices are still in their infancy.

In M2M payments, human intervention is neither required nor expected. Devices that possess enough logic or intelligence to identify goods or services that we need, will be able to manage the full sales and payment cycle, leveraging various electronic payment methods. One example is automated payments at gas pumps, charging stations or parking meters, using in-vehicle payment services. Our cars will know where they are parked and automatically communicate with the IoT devices of the parking facility to pay for the time of use.

M2M payments will also help create new or transform existing business models. One scenario is the sale of above-usage energy produced by solar panels at a residential house. Rather than pushing the power 'back' into the grid at a less favorable price per kW/h, the solar panels or connected devices of the home automation system may decide to sell the extra energy to a neighbor's house directly for a better rate. The involved systems would need to autonomously communicate and enter a transactional relationship, which may even include pricing negotiations.

For the aforementioned concepts to work, the already smart IoT devices will need support from other technologies. Besides hardware prerequisites, such as smart grids or a micropayments infrastructure, two major technologies that have been disrupting the world in recent years are expected to help leap M2M transactions into the future: artificial intelligence and blockchain.

IMPACT OF M2M PAYMENTS ON A SAMPLE HIGH-LEVEL PAYMENT PROCESS FOR METERED PARKING



Source: Capco analysis

THE ROLE OF ARTIFICIAL INTELLIGENCE

Today, AI is all over the media landscape and is advancing gradually into major financial institutions. Those are wisely proceeding with caution and focusing on improving their ability to relay the intelligence they want these systems to learn. Like many other disruptive technologies, including blockchain, AI uses a combination of technologies and concepts, such as machine learning and natural language processing, and converges massive amounts of structured and unstructured data to mimic human cognitive functions (e.g. learning or problem solving[4]).

The IoT and AI complement each other. While IoT devices help collect a lot of data, analytics and device behavior powered by AI can turn data into actionable insights, learn and mimic a consumer's behavior, and even adjust this behavior over time as it changes. AI enables IoT devices to not only communicate with each other dynamically, but also negotiate with other devices or services about an exchange of information or value. This might conjure up undertones of Terminator wars, but AI-supported IoT devices are able to create ad hoc networks with other IoT devices to accomplish tasks, such as the computation of complex problems that require increased processing power near the source of data, low latency, etc.

AI IN FINANCIAL SERVICES

Elements of AI, such as machine learning and predictive algorithms, are already heavily interwoven in processes within the financial industry. For instance, they aid in determining whether a borrower is at risk of missing a payment by analyzing loan payment history and other factors. Other examples include the use of AI in the processing of payments, which helps increase operational efficiency in fraud detection, anti-money laundering (AML) and sanctions screening, or simply the automation of various processes that previously required human interaction. Major efficiency gains are also expected in the corporate payments space, where AI can help with accounting and reconciliation activities between financial institutions and their corporate customers.

Going forward, more AI-powered M2M transactions will have the capability of performing automated electronic payments, using various payment methods like debit or credit, through existing payment networks. Even payments via automated clearing houses, wire transfers and other modes are thinkable, provided they will be accessible for the machines via appropriate services.

However, credit cards will likely remain the preferred payment choice for the foreseeable future, as they can be conveniently used in existing digital wallets. Thus, the 'top of wallet' challenge will intensify as consumers are less likely to change their payment method or card on file once it has been set up. To the chagrin of fans of more dated payment methods, checks, cash or physical payment cards are no longer a 'thing' in the Internet of Things.

CONSIDERATIONS FOR ADOPTION OF AI IN M2M PAYMENTS

Despite the appealing use-cases, applications of AI in payments has not yet taken off to the same degree as in consumer electronics. Limitations, such as the lack of computing power in many IoT devices, prevent running fully-fledged AI algorithms, and a central 'brain' is still required in most areas. At this point, IoT devices mostly provide the data required for AI to learn and function. In addition, there are other issues that will need to be addressed or at least considered before wide-spread adoption of AI in M2M payments. These are described below.

ACCURACY AND COGNITIVE BIAS

AI can do great things and it is very accurate most of the time. However, when AI gets something wrong, there's a huge risk that it gets it very, very wrong. Training data (the data that is used for AI algorithms to learn) can be biased and consequently will train a system to adopt an unintended behavior.

One famous example is an image classification algorithm that seemingly successfully learned to distinguish – with high accuracy - two different but closely related animals, based on images provided as training data. However, the researchers later found that the training algorithm in fact achieved its success rate based on identifying the image background (e.g. snowy vs. non-snowy landscape) and not on the features of the animal itself. This example may appear insignificant at first, but it highlights the risk of cognitive bias creeping into more complex use-cases, with more serious consequences. Bill Gates, Elon Musk and Steven Hawking have all expressed their views about the need for caution with AI.

With the advent of high-frequency trading (HFT) in stock markets, AI is being used to make buying and selling decisions in a split second. There have been multiple incidents that led to brief but noticeable tremors in the stock market caused by HFT algorithms, creating spontaneous and enormous volatility in the market. One of the most notable examples is the flash crash in May 2010, when the Dow Jones briefly fell almost 1000 points.[5]

REGULATION AROUND ACCOUNTABILITY AND TRANSPARENCY

As with other disrupting technologies, the regulations around AI and particularly AI-powered payment transactions need to catch up to provide clarity around their use. Accountability and transparency are two of the more prominent problem areas, as details about the 'who' and 'what' still need to be determined.

- **Accountability**
  Who is accountable for M2M transactions, especially if they have been carried out incorrectly – the software manufacturer, the end-user or the payment processor?

- **Transparency**
  What is required to prove that an AI algorithm has made the right decision in lieu of the human whose data was used to train the machine? Due to the complexity of AI mechanisms (mostly data and algorithms) that lead to a machine's decision, humans may not even be able to reconcile what has led the machine to make a certain decision.

Given the above, financial institutions and established payment companies have been understandably reluctant to enter the field of AI-powered autonomous payments, as their application is relatively new and untested, and creates complications within the regulatory landscape[6].

BLOCKCHAIN AND SMART CONTRACTS

Cryptocurrencies such as Bitcoin have gained great popularity in recent years, along with the intensifying debate questioning their value. The underlying technology of cryptocurrencies, blockchain, has become equally popular and is considered a game-changer as a candidate for nearly endless applications in multiple areas outside of the cryptocurrency space.

The blockchain technology provides numerous features that can further enhance the security and adoption of IoT in general, as well as catalyze the introduction of M2M transactions, including payment transactions. Blockchain, essentially a distributed ledger, is well-suited for storing digital assets, such as currencies, titles, deeds and patents. It has key features that, when used for IoT applications and in combination with AI, can revolutionize machine-to-machine transactions. Aside from features such as a decentralized architecture and immutability of transactions, two main aspects of blockchain should be highlighted:

SMART CONTRACTS

Smart contracts are computer code written to execute when specific conditions have been satisfied or events have occurred. This could be used for transactions involving a trustee, such as the transfer of real estate property rights. In this example, the smart contract would only release or change the title to a property if the payment was received (and other conditions met). The output would be validated by everyone in the network.

The smart contract is stored on blockchain, ensuring that it cannot be changed once agreed to, unless all parties involved agree to make a modification or retire the contract.

Though smart contracts hold promise for replacing intermediaries, one of their key limitations is that they cannot access data outside of the blockchain network. This means that any events happening in the physical world, as well as data that is simply not available on the same network or accessible in the way expected, cannot be recognized by a smart contract without further help. Data oracles (secure data feeds, typically still controlled or overseen by humans) would be needed as input data for the contract[7]. Since these are external data services (e.g. news feeds, stock market prices, inventory, etc.), data oracles need to be trustworthy, tamper-proof and automated, to avoid creating a weak point in the system. They also need to be able to use data from a myriad of sources, such as data provided from IoT devices, and then use complex analytics to determine if an event has actually occurred.

The word 'smart' in smart contracts is misleading, as contracts are merely simple 'if-then-else' constructs in computer code that monitor for specific conditions and execute predefined actions once these conditions are met. They do not possess the ability to create themselves or do anything else that may be considered smart. However, in combination with AI, it is possible to perform contract negotiation and setup.

MICROPAYMENTS

The reduction in transaction costs enabled by blockchain makes it reasonable to be used for very small payment amounts. The example of the sale of excess solar power to the neighbor's house only becomes viable using real-time and micropayments. If power is only required for a few minutes of peak usage, the transaction amount is likely to be very little (possibly less than a dollar). Traditional payment mechanisms usually incur too much transaction cost to be of value for smaller amounts. Think of a credit card transaction where the issuing bank and card network all take a share of each transaction. Costs can be as low as a few cents, but it still makes transactions with smaller amounts unreasonable.

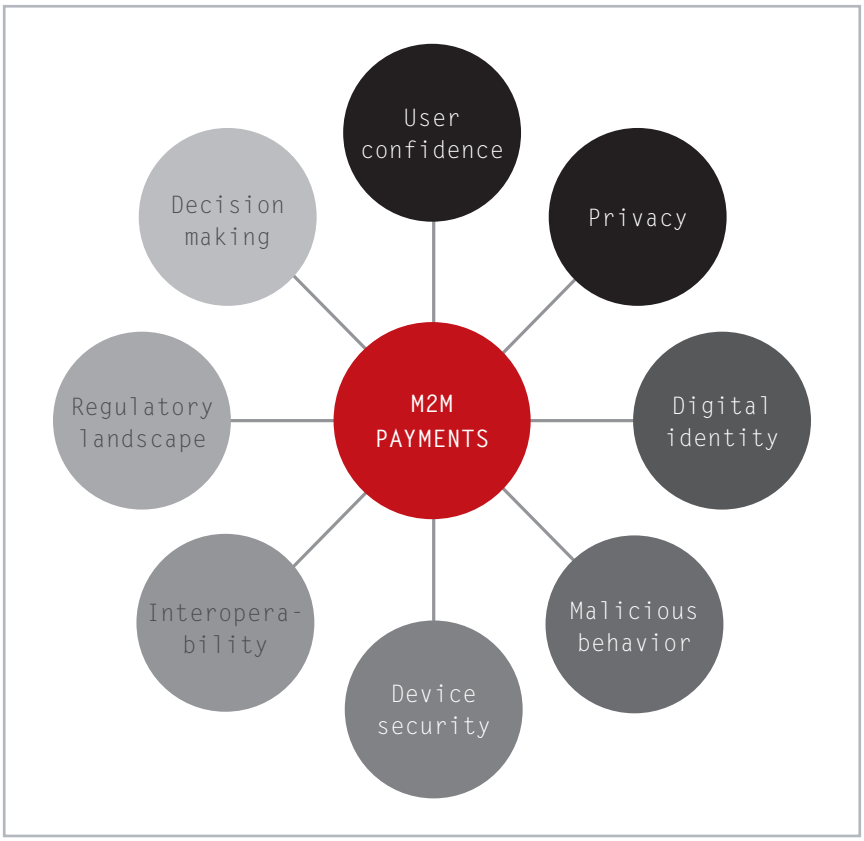
The recently created IOTA Foundation (a non-profit organization dedicated to developing the next generation of protocols for the connected world), has high ambitions to drive research and development of open-source and free-to-use cryptocurrencies and software specifically for the benefit of M2M payment ecosystems. The IOTA cryptocurrency has the potential of replacing other payment methods used in fully autonomous M2M transactions.

ADDITIONAL CONSIDERATIONS

Using blockchain and AI technology appears to be promising but is far from a problem-free, out-of-the-box, plug-and-play solution. Introducing new technologies for increased device autonomy also creates new or elevates existing challenges and concerns that typically hinder rapid mass-market adoption, especially when these technologies are used to handle financial assets. Some of these concerns and challenges are described below (most of them are interconnected and as yet unaddressed).

- **The user confidence** to trust a machine with their financial assets (confidence in purchase decisions and spending control)
- **Privacy** of data collected and used, as well as implications of new regulations, such as General Data Protection Regulation (GDPR), California Consumer Privacy Act (CCPA), or Revised Payment Service Directive (PSD2), particularly in light of data breaches increasing in frequency and scale
- **Digital identities** and their use in M2M transactions (e.g. how a trusted relationship can be built and maintained)
- **Malicious behavior** of AI-powered devices or entire networks (e.g. thingbots) and whether AI decreases or increases the chances for such behaviors
- **Device security and operational integrity**, and the need for manufacturers and systems integrators to follow standards and best practices to decrease device or network compromise
- **Interoperability** and the need for common standards to enhance compatibility amongst billions of devices
- **Gaps in the regulatory landscape** and the need to eliminate uncertainty for machine-powered transactions, including data collected from AI systems
- **Auditability and interpretability of machine decisions**, particularly in heavily regulated fields where transparency is key
- **Data acquisition** for decision-making algorithms and how to deal with incomplete datasets that may skew machine learning outcomes

CONSIDERATIONS AND CONCERNS FOR M2M PAYMENTS



Source: Capco analysis

CONCLUSION

There is still a long way to go before we reach widespread adoption of fully autonomous M2M transactions. Disruptive technologies such as AI and blockchain provide capabilities that can mitigate or eliminate some of the concerns surrounding M2M payments today, but many issues still need to be addressed. These include the interoperability of IoT devices which needs to be standardized by device manufacturers and consortiums and augmented by methods and technologies beyond AI and blockchain. Other still-evolving standards and technologies, such as 5G networks or real-time payments, will also be required for further evolution and scale of the developing device ecosystem[8]. In addition, the regulatory landscape needs to catch up, and implementation will likely remain a challenge for many years.

Meanwhile, financial institutions and payments providers will see traditional payment methods continue to decline, with a shift towards electronic transactions that no longer require physical instruments such as a plastic card. Transaction volumes will continue to increase while emerging business models call for low-value transactions and real-time settlement. If these needs are not met, the traditional institutions' market share for payment services will erode and fall to new market entrants, and to the more junior but agile fintechs.

Financial institutions and market players need to take the following actions:

- Be aware of and monitor the state of M2M payments and their potential;
- Align the future vision of their business and technology operations with upcoming changes and be prepared to act quickly when the time is right;
- Understand how existing and upcoming regulatory requirements that govern the M2M payments landscape impact strategy and operations.

Last, but not least, IoT, blockchain and AI are paving the way for dynamic and rapidly adapting ecosystems. The required adaptability of the consumer to embrace these technologies and to relinquish control will require a long term shift, as M2M payments slowly transform previously human-controlled and machine-supported payments. Humans will likely remain part of the equation as M2M transactions capture more market share and mature to full autonomy. In the longer term, as with other areas of automation, the bottleneck of human interaction will likely become progressively obsolete.

With the increasing pressure from innovative fintech companies and new market entrants, traditional financial institutions need to act quickly to retain their critical market positions.

The U.S. is just beginning to lay the foundation for real-time payments[9], but this foundation needs to be solid to support the next generation of payment transactions and commerce.

Banks can play a critical role in the rollout and adoption. Meanwhile, AI and blockchain can help speed up existing payment processes and further reduce transaction costs.

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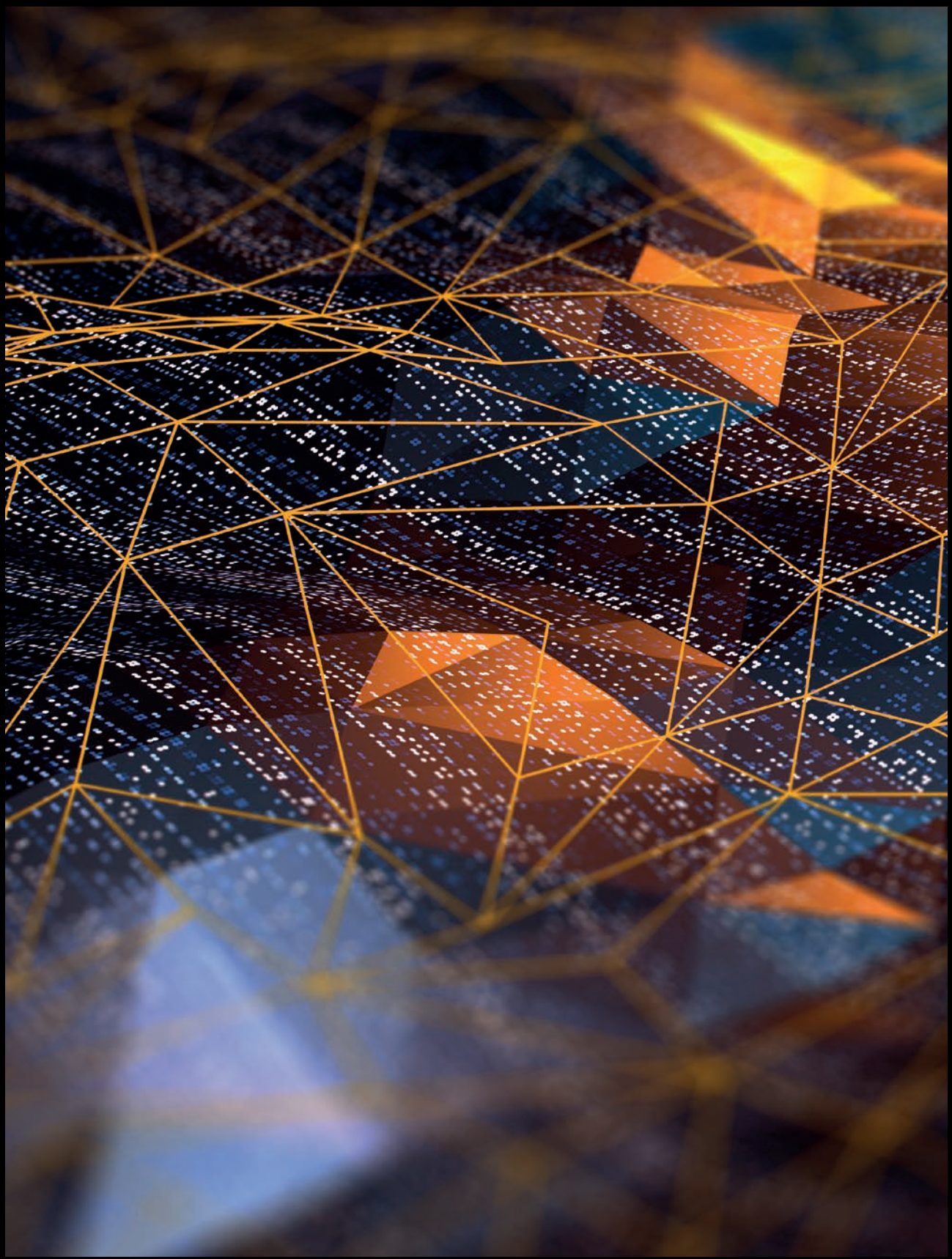

DATA-INFORMED CUSTOMER DEVELOPMENT AND LOYALTY PROGRAMS: FROM EASY WINS TO FULL MATURITY

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NO CUSTOMER LOYALTY WITHOUT DATA

Loyalty programs at banks fail to produce loyal customers. The main reason for this is that banks rely on simplistic loyalty mechanisms based on human knowledge, while leaders in the field, such as Netflix and Amazon, use data and recommendation engines. Amazon states that 35 percent of their revenue originates from the recommendation engine. At Netflix, a whopping 80 percent of content is viewed through one of their automated suggestions.

The detailed workings of the Netflix recommendation engine are a closely held secret, but at a high level they are as follows:

"We estimate the likelihood that you will watch a particular title in our catalog based on a number of factors including: (…) your viewing history (…) other members with similar tastes and preferences (…) and information about the titles, such as their genre, categories, actors, release year, etc. (…) All of these pieces of data are used as inputs that we process in our algorithms."[1]

> *"The best loyalty programs focus on incentivizing interaction with the firm rather than purchases."*

NO CUSTOMER LOYALTY WITHOUT DATA CONTINUED

To contrast, the table below shows a real-life example of how a European bank selects clients to participate in a retirement account mailing campaign.

This selection does not use any real insight, and so the bank continues to frustrate its clients with irrelevant information, while missing out on revenue opportunities.

Today, in times of big data and data-driven insights, it would be natural to think that banks have adopted a refined and systematic approach to customer segmentation and development. However, a close look at current offerings reveals how surprisingly undifferentiated the market is. Beyond the widely-adopted practice of bundling products[2], banks lag years behind the consumer industry. With rare exceptions, banks' loyalty programs only incentivize single behaviors in single products (e.g. credit card spending), as they did years, if not decades, ago. At best, these loyalty programs support repeated purchases rather than increase brand loyalty.

In this paper, we share a proven customer segmentation and analysis model, which demonstrates a simple and effective approach to data-driven customer development and enhanced revenues. We also examine strategic, long term approaches to customer loyalty.

CLIENT TYPE	Individuals
CLIENT DOMICILE	Switzerland
CLIENT AGE	20-55
PRODUCT USAGE	Client does not have retirement account Client does not have retirement safekeeping account

CASE STUDY: DATA-INFORMED CUSTOMER DEVELOPMENT

A large bank asked us to analyze their Retail and Wealth Management customer base and to design a strategy for product and customer development. As a first step, we analyzed the available data to understand whether customers used the bank as their main bank (MB) or as a secondary bank (SB).

We found that the annual revenues vary significantly between MB and SB customers within each segment. With revenue deltas that high, there is easily a business case for a project within a bank that aims to develop secondary-bank relationships towards main-bank relationships.

Net Present Values (NPV) of the differences shown on the next page over a five-year period (and discounted at 12 percent) are approximately $10,000 for Mass Affluent and $29,000 for Core Affluent/HNWI, per customer.

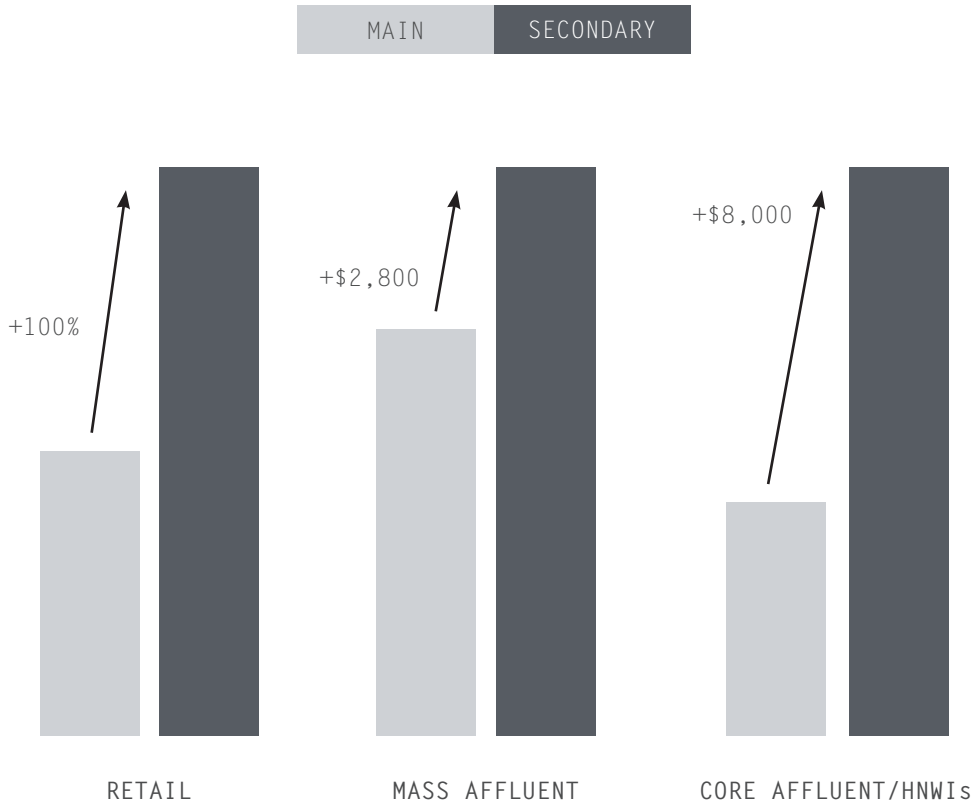
Following this promising initial finding, the next step was to answer the question: **Are there patterns/factors in 'main' and 'secondary' customers that can be managed through sales?**

To answer this question, we developed distinct models for the Retail, Mass Affluent and Core Affluent/HNWI segments[3]. Combining banking expertise with math, the models delivered statistically highly significant results with strong or very strong positive or negative main bank factors.

Factors considered for this analysis were:

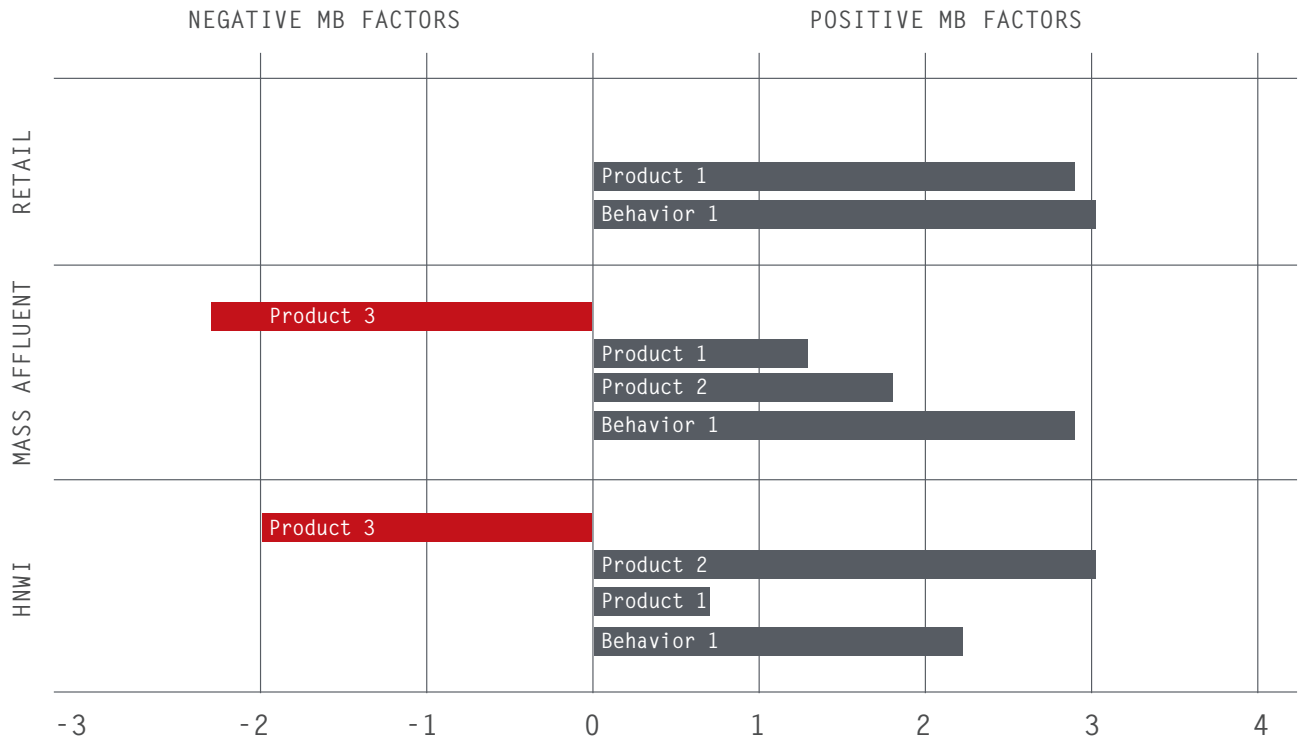
1. **Product usage** (e.g. client has a safekeeping account – yes/no[4])
2. **Services usage** (e.g. client does SEPA payments – yes/no[4])
3. **Combinations of products or services** (e.g. client has active payments AND an active saving account – yes/no[4])
4. **Behavior of customer** (e.g. client logs into e-banking at least once a week on average over every six months – yes/no[4])

REVENUES PER ANNUM: MAIN BANK AND SECONDARY BANK CUSTOMERS ACROSS SEGMENTS



Segments by assets at bank:
- Retail – up to $250K
- Mass affluent – up to $1 million
- Core affluent/HNWI $1 million – 30 million

RESULTS OF THE ‘MAIN BANK’ PREDICTION MODEL, BY SEGMENT



These models are easy to understand and use. The key findings of the case study were:

- Product 1 is a strong indicator for MB in Retail, but loses its significance as client assets increase, playing virtually no role in HNWI.
- Behavior 1 is a strong MB indicator across all segments.
- Product 2, not available in retail, is a strong factor in Mass Affluent and even more so in HNWI.
- Product 3 is not only unimportant for a main bank relationship, but is a strong indicator for a secondary banking relationship.

Based on these findings, the bank can derive and action the following insights:

REDESIGN PRODUCT 1 FOR HNWI

Product managers believed it to be a flagship product for HNWI. Clearly, the customers did not share this view. The bank should either abandon or redesign the high-end version of this product.

CONSIDER BEHAVIOR 1 IN ALL PRODUCT DESIGN, MARKET ACTIVITIES AND VALUE PROPOSITIONS

Behavior 1 was thought to play a role only for Retail clients. However, it was identified as the single most important MB behavior factor across all segments, contrary to the popular perception that HNWI clients are only interested in Wealth Management and their main bank is where they hold the majority of their bankable assets.

STOP SELLING PRODUCT 3 AS AN ANCHOR PRODUCT AND RE-ASSESS INVESTMENT IN 'HOLISTIC' SALES

The analysis also destroyed the long-held view that Product 3 was an anchor product, put in place to ensure comprehensive and holistic advice. In fact, Product 3 increases the probability of a relationship being secondary. This does not mean that the bank should stop offering Product 3, but it revealed that customers did not see high value in buying this product from their main bank (most likely choosing to shop around for the best deal). As a consequence, the bank can eliminate the cost of including this product as part of 'holistic' sales activities and sales & advisory tools.

FIVE STEPS TO STRATEGIC CUSTOMER DEVELOPMENT

1. CONVERT SECONDARY BANK CUSTOMERS INTO MAIN BANK CUSTOMERS

Financial advantages of MB relationships are huge. As mentioned earlier, NPVs (over five years) are in the region of $10,000 for a Mass Affluent customer, $30,000 for a Core Affluent/HNWI customer and even higher for 'pure' HNWI.

The results of the above case study show that just a few products, services and behaviors are sufficient for customers to perceive a bank as their main bank. This opens the possibility for a bank to take strategic, centrally-driven measures. It is not necessary to understand the specific situation of every individual customer to promote and take advantage of these factors.

To increase the MB probability, banks could segment their client base into subgroups that have a single factor. For example, in the case study, in the Retail segment two factors - a product and a behavior – strongly indicate an MB relationship. The bank can dedicate their efforts to convincing the two groups to either show Behavior 1 or buy Product 1 (by offering a significant discount), as this will have a lock-in effect and (on average) double the revenue per customer. These offers should be personalized, as there is no need to incentivize the entire customer book.

With such significant financial benefits, banks must make a concentrated effort to win the main bank factors in their secondary bank customers.

2. RUN PILOT CAMPAIGN TO TEST PROMISING SCENARIOS

In our real-life example, a deeper analysis in Retail showed that Behavior 1 was also an indicator for Net New Assets (i.e. the more intense Behavior 1, the more assets the clients generated). Banks can stagger financial incentives for customers by offering Product 1 either at a reduced cost (for customers with moderate Behavior 1) or completely free (for clients with high Behavior 1).

To avoid over-incentivizing their customers, banks should test the mechanics of such initiatives in pilot campaigns and refine accordingly.

3. START SIMPLE, USING EXISTING TOOLS

It is not necessary to 'break the bank' by introducing new tools for a main bank customer initiative. Existing channels such as mail are enough to get started. Off-the-shelf tools to prepare, execute, analyze campaigns and track executed/declined customer offers are widely available and sufficient in the early stages.

The financial gains of applying customer insights (as shown) can be significant, and do not require enhanced corporate capabilities.

4. LATER, ESTABLISH STRUCTURED INCENTIVIZATION MECHANICS

A bank would want to harvest the low hanging fruit first and early successes with minimal investment efforts are important. As an organization matures in this field, a more systematic approach is needed. Banks should establish incentivization beyond tactical measures such as one-off campaigns. A framework must be developed that quantifies benefits of additional products, services or customer behaviors and automatically incentivizes customers to expand their relationship with the bank.

In short, banks need a loyalty system to capture the business rules for how customers earn and use incentives.

5. DEVELOP A CUSTOMER DEVELOPMENT / LOYALTY STRATEGY

If banks were to enter the loyalty champions league of firms such as Apple, IKEA or Harley Davidson, they would need to become 'loyalty organizations', i.e. base their corporate activities on customer loyalty insights, rather than simply improving their disconnected loyalty programs.

Loyalty leaders continuously seek customer feedback and use it not only to create new products or features, but also to refine the corporate strategy itself. They create a community with their customers and have a fan base rather than a customer base.

The best loyalty programs focus on incentivizing interaction with the firm rather than purchases.

CUSTOMER DEVELOPMENT (LOYALTY) PROGRAM DESIGN

Considering the mechanics of incentivization, there are three levels of customer development/loyalty programs maturity:

- A firm can choose to select only one incentivization method on the 'earn' side. This is best for firms where either one product is representative for the entire customer relationship or where the firm only offers one product. Obviously, this is not the case in a bank. Excluding prime clients from a loyalty program just because they do not use the bank's credit card may not be the best of solutions.

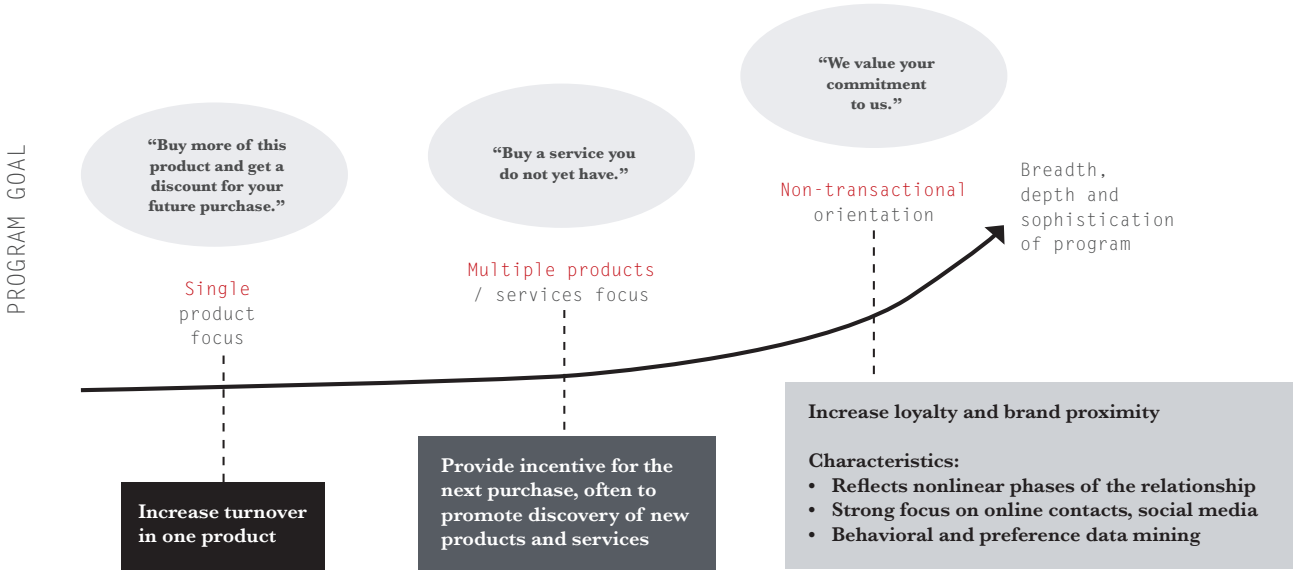
- To incentivize clients further, firms can use multiple products, services and behaviors. Often, these programs promote the exploration/purchase of products that customers do not already use. More corporate capabilities are needed to run such programs to ensure the full benefits are realized and there is no ambiguity as to what to offer to whom, what the financial gains are from product combinations and which price elasticities are prevalent in different client segments.

- The third level comprises the non-transactional programs, where the main objective is to incentivize interaction with the firm.

As of today, no bank known to us has adopted the most advanced level. However, as examples of the consumer industry show, it could be a highly beneficial approach for a bank. It also means a strong commitment to a strategic and future-oriented approach to loyalty. However, the capabilities needed to successfully operate on this level are significant.

Forward-thinking banks aiming at the highest level of customer loyalty should develop a staggered approach and harvest the lower hanging fruit of the 'multiple products' level first, by adopting the methods outlined in this paper. With financial successes here, banks can gradually introduce non-transactional concepts.

LOYALTY PROGRAM MATURITY LEVELS: BASIC FUNCTIONALITY AND GOALS

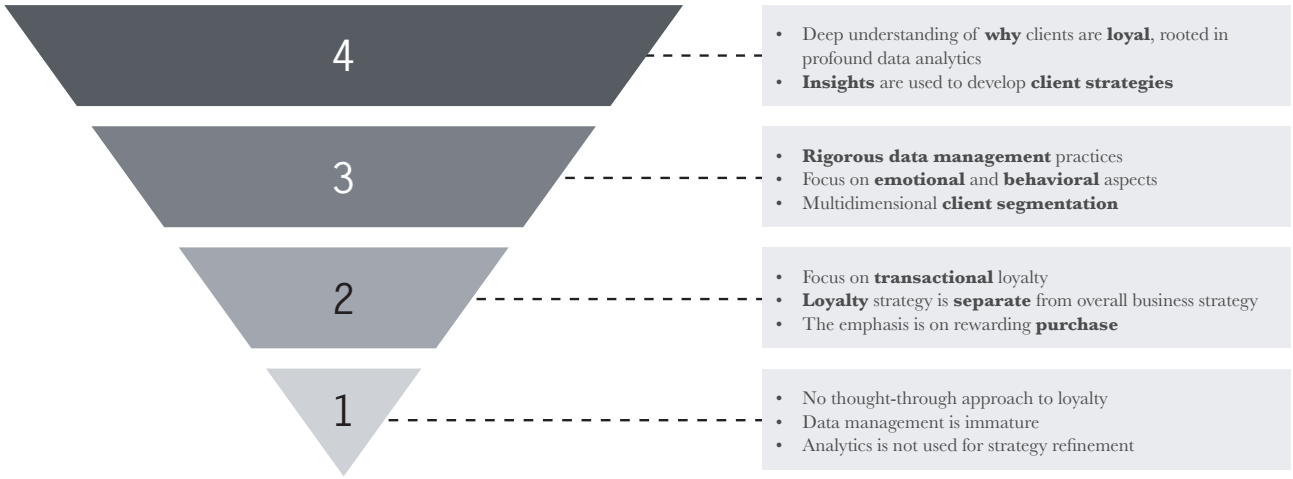


CONCLUSION: DATA ANALYSIS CAPABILITIES AND CORPORATE CULTURE

As we have shown above, most banks can already benefit significantly from adopting simple client development measures. However, to target the maturity levels of leaders in loyalty (from other industries), banks must consider further requirements necessary for success.

Developing and running simplified loyalty programs based on static program mechanics does not demand advanced analysis skills or organizational maturity. For example, to manage a loyalty program based on credit card spending, only a few factors need to be controlled: profitability of credit card turnover, value of benefits earned and the redemption rate of the program.

On the other end of the spectrum are the firms that generate deep insights from their data and customer interactions and use these insights across all activities, from optimizing processes in operations to refining customer strategies. These are the ultimate long term objectives that will help banks stay relevant in a data-driven future.



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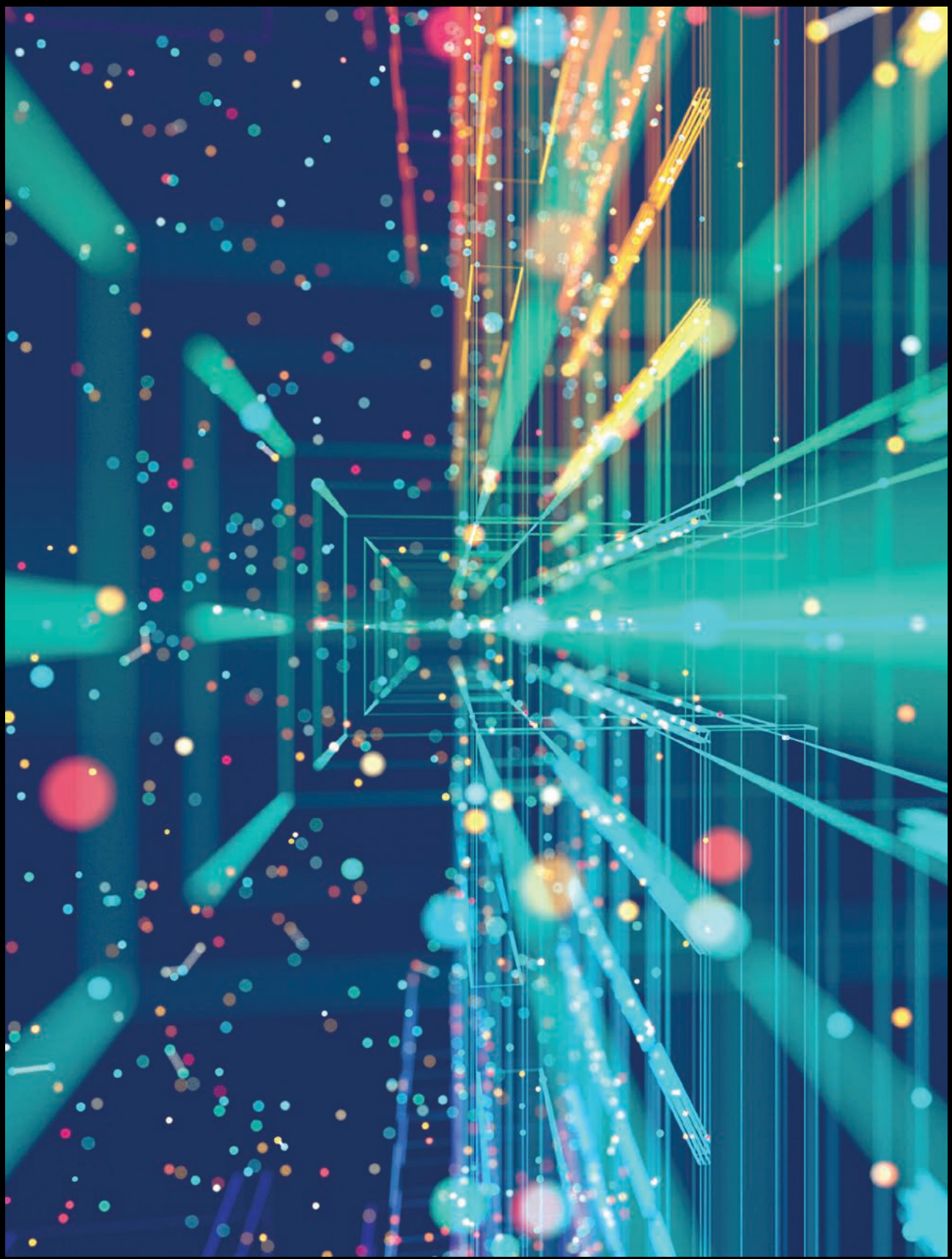
[3] Logistic regression analysis, based on self-identification of clients as main/secondary bank customers

[4] Illustrative example



DEMOCRATIZING MACHINE LEARNING

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April 2019

SUMMARY

Big data is here to stay, and it's only going to get bigger. Organizations are investing in tools and resources that can harness the power of that data, but not everyone knows how to capitalize on it. It's a difficult and expensive job, even for the highly-trained data scientist, of whom there are few. To counter the skills gap, we are seeing an evolution of tools and technologies designed to make it possible for, say, a business analyst to access and manipulate even massively large datasets. For example, Google launched Dataset Search and BigQuery – easy to use platforms that scale to big data and can be leveraged by everyone in the organization. Google took this a step further through its release of BigQuery ML, a tool to build and deploy machine learning models through simple, broadly understandable SQL statements.

These self-service tools eliminate the prohibitive skill barrier, offering non-technical users access to an internet of data and the power of machine learning to analyze it. Though some banks have begun to explore their options with respect to large-scale adoption of Google Cloud AutoML solutions, others have been reluctant due to concerns that security and code dependencies remain. In this report, we discuss these concerns in relation to current solutions and highlight key considerations and take-away messages for financial institutions.

INTRODUCTION

Machine learning (ML) is the science of getting computers to act without being explicitly programmed. It is based on algorithms that can learn from data without relying on rules-based programming. In the past decade, machine learning has given us practical effective web search, self-driving cars, speech and face recognition and a vastly improved understanding of the human genome. As the technology evolves and ML becomes more pervasive, we are seeing its tremendous potential for value creation, so much so that it is hard to imagine the future of the financial services without machine learning.

TRENDS ACROSS INDUSTRY

MACHINE LEARNING TECHNOLOGY TRENDS

Machine learning has been the buzzword of the decade and is certainly one of the most disruptive technologies of this century. Though still considered by some to be nascent, it is creating significant value for the world economy. The International Data Corporation (IDC) forecasts that spending on ML and artificial intelligence (AI) will grow from $12 billion last year to $57.6 billion by 2021[1], within which the ML market alone is expected to grow from $1.41 billion to $8.81 billion by 2022.

Executives in companies around the world are increasingly looking to AI to create new sources of business value. This is especially true for leading adopters of AI. These so-called 'pioneers', who are leading the race ahead of investigators, experimenters and passives, are doubling down on AI investments, building competencies, and working to take AI to scale[2]. As well as deepening their commitments to AI, pioneers are also prioritizing revenue-generating applications over cost-saving ones – a significant adjustment from the traditional business approach.

A SHORTAGE OF MACHINE LEARNING EXPERTS

While machine learning has the potential to create marked business value and efficiencies, for many the potential remains just that, with numerous barriers still existing. These barriers are varied and many, be they a lack of executive-level opt-in, data inaccessibility, or poor data quality. Arguably however, the most substantial obstruction to organizations' efforts has been a lack of skills.

The insatiable demand for creating value from data has given birth to a web of new, highly technical jobs, and the need for ML specialists is on the rise. The wide range of fields is inviting many candidates of varying expertise, a fraction of whom are versed in more advanced programming languages, making them ideal for the job as they can directly apply their skillset to build ML models. On the other hand, the majority of candidates either lack the prerequisite level of programming skills or do not possess the necessary understanding of the underlying machine learning theory. Despite a proliferation of specialized courses, titles, and university degrees, there remains a huge imbalance between demand and supply, presenting a significant barrier for organizations eager to unlock value from their data.

THE RISE OF THE CITIZEN DATA SCIENTIST (CDS)

Rather than attempting to hire finished articles in an increasingly barren marketplace, companies have opted for investing in retraining their staff, and upgrading their existing talent pool. For example, insurers are training actuaries in data analysis skills[3]. The approach has several advantages, most significantly, it advances data skills across the board. This is especially key at a time when a growing number of organizations are attempting to democratize data science capabilities across the workforce, rather than concentrate it within a data science function.

This trend was highlighted back in 2016, when the term 'citizen data scientist' (CDS) was coined[4], referring to a person who can use advanced data analytics capabilities to create models despite

their job function being outside the field of statistics and/or data science. Indeed, the approach is an effective path to mitigate the skills gap by avoiding the need for dedicated data analytics or business intelligence experts altogether. The rise of the CDS has generated much interest within organizations, since the CDS can manage both the technical data analysis and the business demand, in turn spreading the data-driven culture that data advocates crave.

TECHNOLOGY THAT IS ACCESSIBLE TO EVERYONE

Concurrently, technology giants have been working on reducing the demand for skills and making technology more accessible. There is now an ever-growing plethora of tools and services designed to facilitate big data analytics outside of the IT lab, and across the organization as a whole. Most recently, developments have extended their reach to incorporate easier accessibility to both data and analytics, and tools now exist that can incorporate ML capability to automate data preparation, insight discovery and data science. Vendors such as neptune.ml are already offering pay-as-you-use pre-trained models as a starting point, as well as using built-in assistive features that simplify and accelerate the process.

Large players are expediting this trend, Google in particular. Earlier this year, Google launched Google Dataset Search, a search box akin to the Google Search bar, but focussed wholly on datasets. The launch was followed by the introduction of BigQuery and BigQuery ML, tools also designed by Google to make it easy to access and manipulate large datasets. For example, BigQuery requires knowledge of SQL only, as opposed to traditional data science languages such as R and Python. The launch of these platforms emphasizes the value Google sees in making big data analysis more accessible.

Democratizing machine learning by making it an accessible commodity to anyone with SQL experience could be a real winner for Google. We predict that even the largest, most complex organizations will seek the technology that can give a technical business analyst the ability to generate ML-level value from massively large datasets.

As the creation of a data model is delegated to the machine, the demand on the skill level of the user is reduced accordingly. This is, perhaps, the natural progression of big data analysis.

THE TRANSITION FROM MAN TO MACHINE

Traditionally, the considerable success of machine learning has relied on human ML experts to perform tasks such as data pre-processing and cleaning, feature selection and model construction, parameter optimization, model post-processing and analysis. Today however, new ML algorithms can autonomously identify patterns, analyze data, and even interpret data by producing reports and data visualizations. Not only that, but these tools come boxed and wrapped up with an easy-to-use platform, providing an agility unlike that of the coding-heavy, statistical world of traditional machine learning methods. Much of the technical analysis work is now delegated to the machine.

The big tech players have, to varying degrees, capitalized on this trajectory through their 'machine learning as a service' offerings.

GOOGLE: BIGQUERY - ML WITH SIMPLE SQL

If you haven't heard of BigQuery, it is a massively parallel-processing columnar storage data warehouse which Google offers as a service on their cloud. In plain language, this means a platform that, this translates into a platform that scales to big data and can be leveraged by everyone in the organization. Within that, Google offers Cloud AutoML, where users can train high-quality custom ML models with minimum effort and machine learning expertise. Cloud AutoML was a massive leap forward for Google, and a huge appeal to any organization interested in tapping into the power of deep learning without hiring a data scientist.

More recently, Google added a new capability to BigQuery by introducing BigQuery ML, a tool to build and deploy ML models through simple, broadly understandable SQL statements. Analysts can build and operationalize ML models on large-scale structured or semi-structured data, directly inside BigQuery, using simple SQL – in a fraction of the time.

AMAZON: SAGEMAKER - END-TO-END MACHINE LEARNING MODEL MANAGEMENT

Amazon Web Services seems to have more to say about end-to-end model management with SageMaker – a fully-managed platform that enables data scientists to quickly and easily build, train, and deploy ML models at any scale. The solution removes all the barriers that typically slow down developers who want to use machine learning by promoting a visual-centric approach to model development that integrates with MapReduce and other Amazon tools. At its core, SageMaker offers a rapid ML model generation environment whilst seeking to economically weigh ease-of-use against advanced technical capability.

MICROSOFT: AZURE & LOBE - DRAG-AND-DROP ENVIRONMENTS WHERE NO MACHINE LEARNING EXPERIENCE IS REQUIRED

Microsoft, meanwhile, is addressing data lineage and model management lineage as well as data governance with Azure ML.

Azure's ML Studio is a cloud-based environment that you can access from your browser and use to create ML-based models on any dataset of your choosing. Following the general trend of accessible ML, the unique selling point of this platform is to give a data scientist – without any prior machine learning experience – the ability to experiment with ML on datasets. It requires prior knowledge of the R and Python programming languages as a prerequisite.

Other tools also exist to allow those who know the theory of deep learning but have no coding experience to just create a deep learning model within minutes without coding a single line. Lobe (recently acquired by Microsoft) does exactly this. Lobe offers users a clean drag-and-drop interface for building deep learning algorithms from scratch, without having to know the ins and outs of libraries such as TensorFlow, Keras or PyTorch for example.

SCOPE AND LIMITATIONS: PRACTICAL POINTS FOR MACHINE LEARNING PRACTITIONERS

Despite the investments the tech industry is making towards making ML more user friendly, there remain limitations of this 'self-service' model. These are described in the following sections.

ONLY SIMPLE INFERENCE MODELS SUPPORTED

While BigQuery ML is arguably the best-designed, in-database machine learning stack, the current version supports only two types of models: (a) linear regression, which is used to predict numerical values, such as sales forecasts, and (b) binary logistic regression models, which can be used to do simple classification, like classifying loans as 'good' or 'bad'. Moreover, in both cases, the prediction mechanism as it stands cannot be used online and in real-time, as call-associated latencies are larger than those offered (and expected) by typical inference model solutions.

BEING ABLE TO EXPLAIN WHAT THE MACHINE LEARNING ALGORITHM DOES

Much has been made of 'explainable AI'[5]. This is the concept that we can only trust the results of an ML-generated algorithm if we understand how the algorithm produced them. Since machine learning does not require precise instructions on how to automate a task, and instead finds the best approach itself, the user needs to figure out the approach themselves. If the user doesn't understand the mechanics behind machine learning, they may struggle to do this.

OTHER TANGIBLE LIMITATIONS

The complexity of ML is not only about choosing the right algorithm, but also about selecting the right architecture (number of layers, number of nodes, sequence of algorithms, etc). For example, regularization and optimization are rarely one-step processes. Instead, they are methodical processes that often necessitate changes in the architecture of the model, such as incorporating new hidden layers and multiple parameter changes.

LESSONS LEARNED

With tactical advances being observed in AI technology, machine learning democratization is the current direction in which data analysis appears to be headed. Google's BigQuery is increasingly being selected by enterprises to drive their data warehouse modernization initiatives. The solution provides extreme scale and performance for organizations; but modernizing your data warehouse requires more than just computer horsepower and unlimited storage; analytics modernization is a journey fuelled by data.

As data science continues to emerge as a powerful differentiator across finance, almost every software platform vendor's goal should now be focused on making simplification through automation of various tasks.

CREATING A MORE PERVASIVE ANALYTICS-DRIVEN ENVIRONMENT

Due to the involved complexity and lack of resources, not all enterprises will be able to leverage data science within their organizations, especially since access to data is currently largely uneven. What a lot of organizations do have plenty of are skilled analysts that could, with the availability of these new easy-to-use technologies, perform data analysis and create models to run predictive and prescriptive analytics. Being equipped with the proper tools should enable them to go beyond the analytics reach of regular business users.

The vast amount of analysis produced by CDSs will feed and impact the business/enterprise. Organizations will also have access to more data sources, including more complex data types, while developing a wider and more sophisticated range of capabilities across the firm.

Combined, these factors ought to eventually create a more widespread analytics-driven environment, empowering analysts throughout the organization, with a simplified form of data science. Simultaneously, data scientists can shift their focus onto more complex analysis.

DATA GOVERNANCE AS THE KEY TO ACCESSIBLE MACHINE LEARNING

Interestingly, the launch of BigQuery and AutoML is complemented by the launch of Google Dataset Search, which includes Google's preferred guidelines for dataset providers to create metadata to support their datasets. The purpose of this 'governance' mechanism is to ensure that datasets that the algorithm searches for can be found and indexed. As more datasets are generated and uploaded onto the internet going forward, this ensures the algorithm doesn't become outdated.

This is a crucial element in implementing machine learning at enterprise scale. A parallel can be drawn with the Airbnb platform, which faced a dearth of available supply of rental

apartments when expanding to Paris. To counter this, the firm bought apartments to then offer for rent. This spurred the usage of the platform to the point where the issue was resolved. In similar fashion, data has to be supplied constantly, comprehensively and consistently, for machine learning platforms to generate business value. Data governance is one method of achieving this.

Private institutions with large quantities of data, such as banks, are investing a lot of money to achieve data governance. Most large banks are at such a scale that separate departments within the bank operate as independent units – across products, regions, and business functions. Since data-generated insights are generally most powerful when supported by data that includes everything, it is important for banks to find a way to be able to access their data holistically, despite the federated structure within which they operate. Since the operational structure cannot be readily changed, data governance must have an operational structure of its own.

Google's user base and the opportunities for dataset providers that come with it, mean that the preferred guidelines will be successfully adopted. Passing the responsibility for maintaining a dataset to the dataset provider – which Google's approach does since it is in the interest of the dataset provider to be easily located and accessed – is the simplest method to ensure compliance. It is the lack of such an enforcement mechanism that is causing banks so much trouble.

Could banks adopt a similar approach to Google? To do that they would need to change their incentive structure to make data governance the responsibility of each employee. They will certainly need to address these concerns soon, as HSBC for example have signed a seven-year partnership with Google. The Google Cloud Platform, with its BigQuery and AutoML capabilities included, will likely be a part of that.

MAKE CULTURE YOUR ENABLER, NOT YOUR ROADBLOCK

To create significant business value out of data and analytics, organizations need more than just technology. There is a key additional ingredient – a special mindset, one which grasps the need and importance of a strong analytics culture.

Transforming your environment into one which recognizes data and insights as the catalyst towards more objective and efficient decision-making processes will mean that data and findings are more easily discoverable. The benefits then of using self-service technologies are immense, as insights are more easily shared with and systematically accessed by the right people.

Having this cultural readiness to consume and interpret data will make teams more effective and eventually more successful in discovering business opportunities.

CONCLUDING THOUGHTS

Banks have a mix of legacy systems running along more modern, virtualized applications, and like any large organization, many will have managed a very large and diverse portfolio of suppliers for decades. With this dependence, the financial sector is one of the more cautious industries when it comes to adopting the cloud and associated data analytics tools.

Many banks none-the-less have recognized the need to establish the ability to use machine learning as a core competency within their organizations. For example, one of the world's largest banks, HSBC, is a much-vaunted Google Cloud Platform customer[6]. HSBC has adopted the use of the BigQuery data warehouse for real-time anti-money laundering analytics and is now also running machine learning models on top of time series data. The bank is also adopting self-service tools, analysing data and generating models on platforms such as Amazon Web Services and Microsoft Azure.

Easy-to-use machine learning tools serve as a catalyst for integrating the technology at scale, retraining existing staff, and creating a working data governance process. The emerging ecosystem, consisting of marketplaces for data, tools, platforms, algorithms and computing infrastructure, will make it easier for organizations to maximize the benefits of machine learning. This increased accessibility will also be particularly powerful in several use-cases (e.g. financial risk assessment) that have been traditionally cost-prohibitive. With a lower barrier, and with banks starting to recognize the need to establish machine learning as a core competency, we foresee a strong future for machine learning within the financial services industry.

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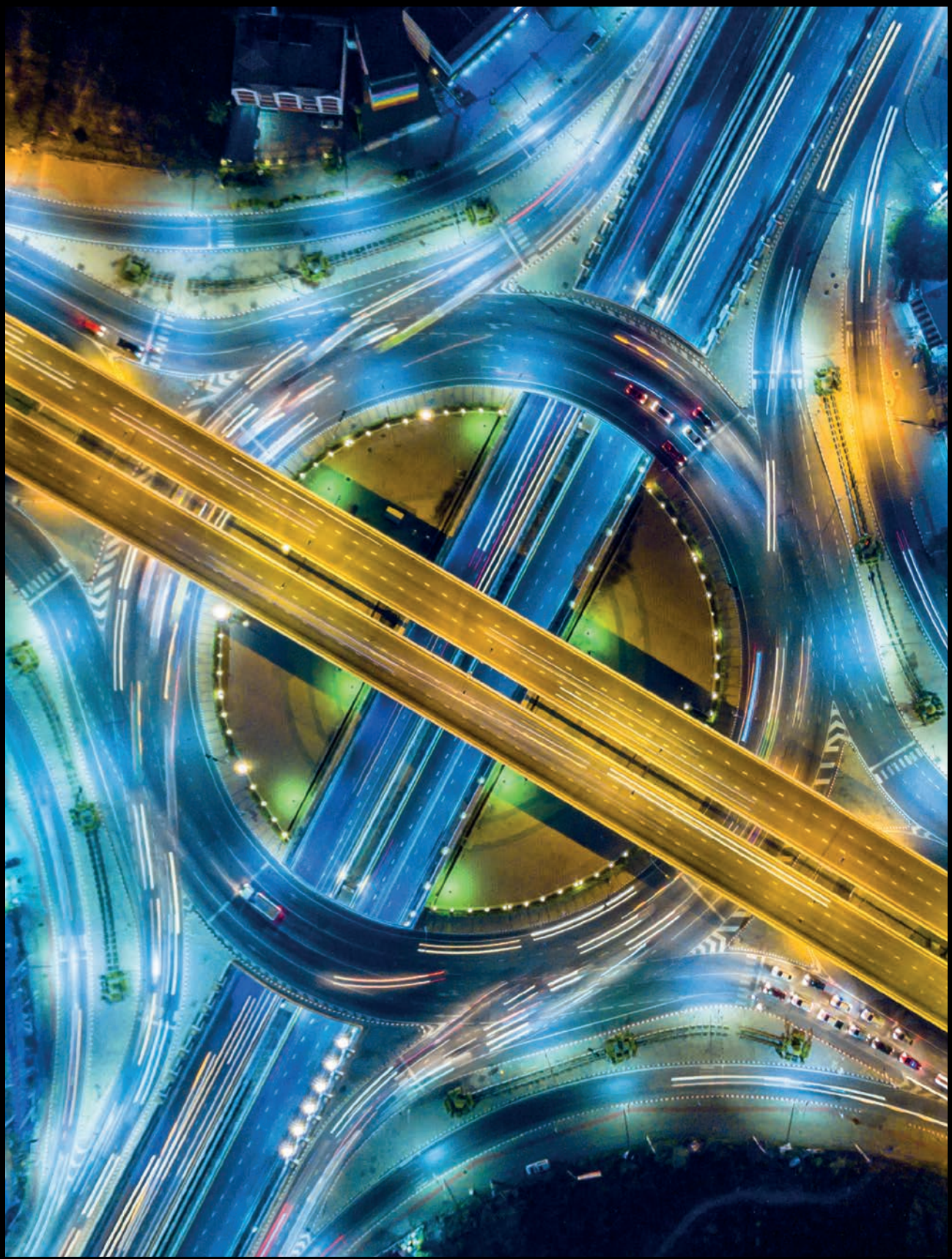

FUTURE-PROOFING INSURANCE: ASIA INSURERS GEARING UP FOR DIGITIZATION

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April 2019

SUMMARY

Recent fundamental demographic and market shifts in Asia signal the need for insurers to look at the products, processes, and enabling technology required to stay relevant in the new era. Success in the region will require more than the insurers' own digital enablement. Effective application of emerging insurtech innovations specific to these markets will be critical to earn the right to play and win in the region. In this paper, we examine the economic and regulatory factors that are unique to Asia, as well as the diverse and evolving needs of regional consumers. An understanding of these factors and how they are inevitably linked to one another will help distill the nuances of what insurtech means to insurance companies and how it can help them gain competitive edge. This study delves into five key insurtech trends. It also looks at insurtech innovations and their use-cases that provide opportunities for insurers to shape their digital agenda and achieve growth in the region.

> *"The combination of surging affluence, flourishing societal and political landscapes (evidenced by becoming home to 46 percent of the world's population by 2020), globalization of economic policies, and liberalization of regulations has set Asia on course to take a prime position in the demand for insurance, with digital as its preferred channel."*

INTRODUCTION

Major economic, societal, and technological trends are redefining the boundaries in which insurance companies operate in Asia. The region is experiencing unprecedented growth ushered in by urbanization and a burgeoning middle-class wealth. Coupled with lower regulatory barriers in certain countries, it offers important growth opportunities for insurers amidst a lackluster global outlook. These opportunities are currently underpinned by a wave of emerging insurance technologies and the unique demands of Asian consumers that in turn have profoundly impacted the way insurers operate in this increasingly competitive market.

There have been significant strides made by the industry to adopt emerging technologies to complement the value chain, adjust their business models and products, or entirely change the way they operate. In recent years, the insurance industry has embraced digital transformation in a bid to improve distribution, product margins, and, above all, to match or exceed customer expectations.

Recent fundamental demographic and market shifts in Asia signal the need for insurers to look at the products, processes, and enabling technology to stay relevant in the new era. Success in the region will require more than the insurers' own digital enablement. Effective application of emerging insurtech innovations specific to these markets will be critical to earn the right to play and win in the region.

In this study, we examine the economic and regulatory factors that are unique to Asia, as well as the diverse and evolving needs of regional consumers. An understanding of these factors and how they are inevitably linked to one another will help distill the nuances of what insurtech means to insurance companies and how it could help them gain competitive edge. This study delves into five key insurtech trends. It also looks at innovations and their use-cases that provide opportunities for insurers to shape their digital agenda and capture growth opportunities in the region.

CHANGING ENVIRONMENT - ASIA IS THE BRIGHT SPOT

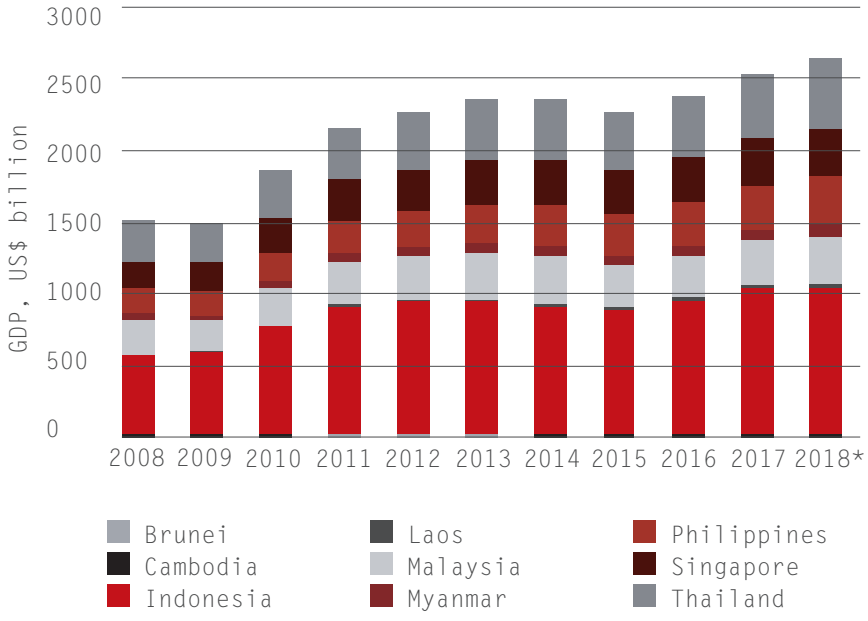
UNDERSTANDING THE POTENTIAL OF ASIA

To gain a good understanding of the insurance industry in Asia, we need to take into account the macroeconomics of the region, as the industry's growth often moves in tandem with the economic progress of a country. In the era of tempered global economic growth, Asia is one of the bright spots. From a general insurance standpoint, Asian countries (excluding Japan) accounted for 76 percent of the overall global insurance industry premium growth in 2017 ($157 billion).[2] Life insurance experienced a 14 percent growth in premiums, with China accounting for nearly 80 percent ($73 billion).[3]

Spotlight on China: China has been experiencing a steady GDP growth of around 6 percent year-on-year, helping it become the second largest economy in the world. Its insurance market has also grown to become the third largest in the world. In the period of 2010-2015 alone, the Chinese market grew by 80 percent to reach $385.5 billion in gross written premiums, outpacing Japan and the U.S.

Southeast Asia: during a similar period, economies of the Association of South East Asian Nations (ASEAN) has experienced similar growth. From 2008 to 2018, ASEAN GDP grew significantly from $1.7 trillion to $3 trillion.

ASEAN (ASSOCIATION OF SOUTH EAST ASIAN NATIONS) GDP GROWTH (2008-2018)



Source: Statista.com

SHIFTING ECONOMIC TIDES AND CUSTOMER PREFERENCES

Although the demographic changes in Asia are impacting demand for insurance products, the industry must also account for the nuances of consumption patterns in the region.

Like their peers in the West, Asians consumers are open to innovation and value how new technologies are helping them connect with the rest of the world (smart phone users in the region increased from 39 million in 2007 to potentially 1.81 billion in 2018).[4] The modern Asian consumer is also more educated and faced with more choices than previous generations. For these consumers, the traditional model of relationship-based sales for simple financial solutions and products is no longer adequate.

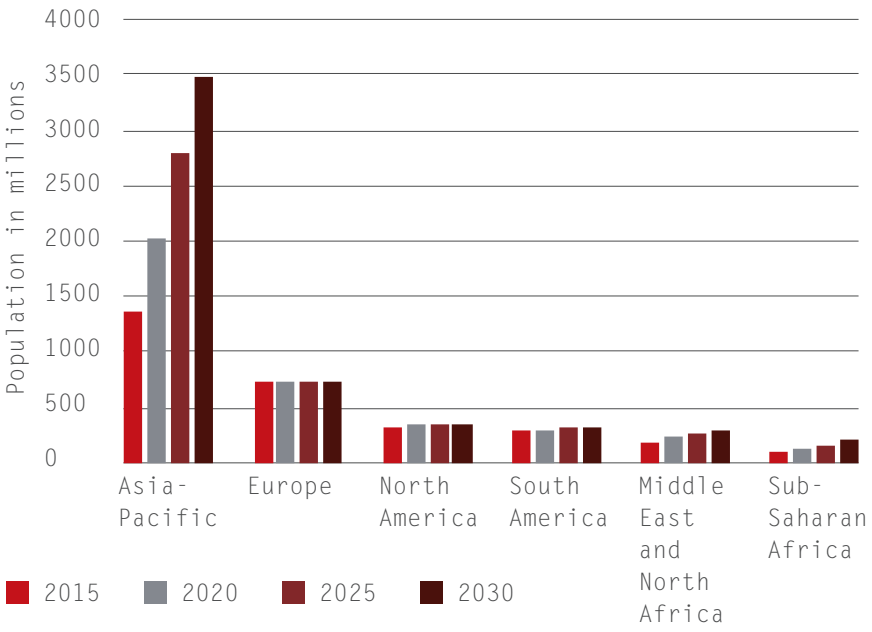
Asia's growing millennial generation has greater purchasing power than the baby boomers and gen-Xers that came before them. Their 'me-first' mentality has been continuously influenced by technologies, where internet access, coupled with pervasive social media, have changed the modes of consumption. Consumers now demand a multitude of choices at their disposal, price transparency, convenience, and simplicity with the aim of instant gratification. Personalized, face-to-face interactions accompanied by branch visits and meetings with insurance agents are no longer the expectation.

In addition, the number of people joining the middle classes in the region is also growing, by an average of 10.5 percent. One example is in Indonesia, where the middle and affluent classes are expected to grow to 135 million by 2030.

According to a recent report by the Brookings Institute, the new middle classes will be predominantly Asian with "almost nine in ten out in China, India and South and Southeast Asia." This offers great promise for businesses, including insurance companies, as this segment is projected to reach 4 billion people by 2020 and 5.3 billion globally by 2030.

Brookings Institute further calculates that the middle class markets in China and India will reach $14.1 trillion and $12.3 trillion by 2030, respectively. By comparison, the U.S. middle class market is projected to be $15.9 trillion by 2030.[5]

GLOBAL MIDDLE CLASS GROWTH FORECAST



Source: Statista.com

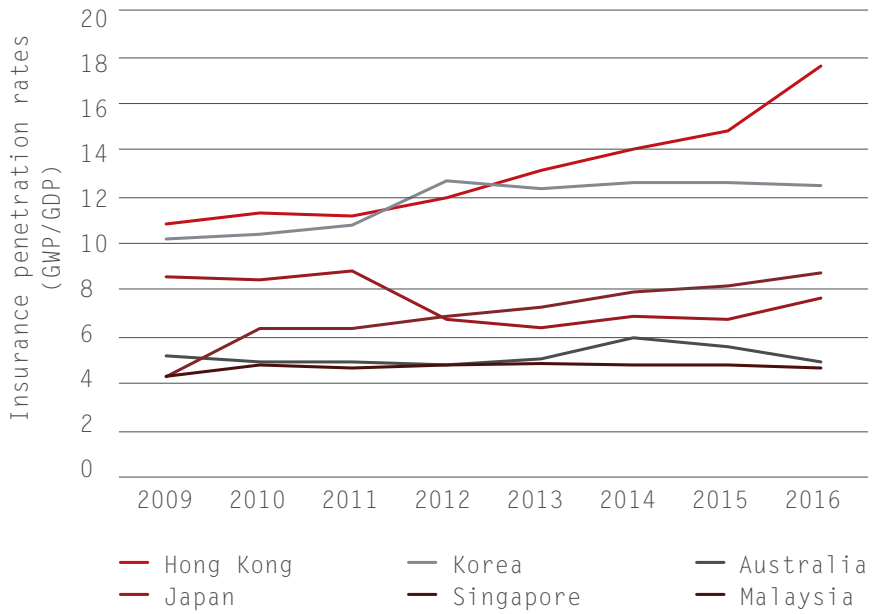
In China, the domestic sharing economy has already reached $500 billion in 2016 and is projected to grow by an average annual rate of 30 percent over the next five years.[6] The way insurance is delivered has been greatly influenced by this shift in consumer demographics and preferences.

The combination of surging affluence, flourishing societal and political landscapes (evidenced by becoming home to 46 percent of the world's population by 2020), globalization of economic policies, and liberalization of regulations has set Asia on course to take a prime position in the demand for insurance, with digital as its preferred channel.

Despite the increase in premium growth, the region still has a long way to go to reach the more developed insurance markets of the worlds. The average per capita spending on insurance coverage is around $357. This is considerably lower than the average for the rest of the world, which is $1,340. According to Forbes, Asia holds 43 percent of the world's population but accounted for only 13 percent of total premiums in 2016.[7] The combined market size of Indonesia, Thailand, the Philippines, Vietnam, and Malaysia in 2015 was only 13 percent of Japan's and 4.5 percent of the U.S., in terms of gross written premiums. The penetration rates for life and non-life insurance combined stands at about 1 percent to 5.5 percent for these five nations, as opposed to about 11 percent for Japan and 7 percent for the U.S.[8] This deficiency highlights the significant opportunity for insurers to capture the uninsured and further foster financial inclusion.

Countries that have experienced significant growth in penetration rates in the past seven years are Singapore, Hong Kong, and Korea, with the latter two being the highest in the region. Singapore has shown strong signs of stable growth and the potential to catch up with HK and Korea, per OECD data. Other countries in APAC have a stable penetration rate of around 5 percent to 7 percent, with HK leading the way at 17.6 percent. This could be considered as a benchmark, acting as a barometer towards which other countries can strive.

SELECT APAC COUNTRIES' INSURANCE PENETRATION RATES (2009-2016)



Source: OECD

ALL ROADS LEAD TO DIGITAL

Insurance has always been a data business. It covers various risks by creating pools of funds based on different insurance lines factoring in loss probabilities as well as consumer behavior. Forecasting these risks with greater accuracy and providing transparency to consumers will positively impact insurance premiums and create opportunities for customer segmentation. This can also have the ripple effect of creating new business models and products.

Globally, the traditional agency and bancassurance models are slowly being replaced through richer data engineering. However, the biggest disruption to the industry is coming from digital, in both consumer and peer-to-peer business models. A recent study has suggested that the global digital insurance market will grow at an annual CAGR of 13.7 percent for the next five years.[9]

Big Tech has cannibalized the industry in terms of distribution, marketing, and product sophistication. Chinese tech giants Tencent and Alibaba together established Zhong An, the first online-only property insurance company, and have jointly entered the market to capture a slice of the sizeable industry by leveraging their vast, pre-existing communities as a ready-made channel to distribute their insurance products. Simultaneously, new and innovative products that insure against trends and current events have led to the rise of microinsurance. For example, Zhong An's medical policy on 'overdrinking' during the 2014 World Cup period offered medical fees for intoxicated fans. The company also offered a Night Owl insurance, which covered medical and emergency related expenses.

The industry has also recognized the value of digitization. The development of digital-only offerings such as Kyobo Lifeplanet, Singapore Life, and Vouch allows for more leads to be generated through the digital ecosystem than through traditional agents. Bowtie, a Sun Life-backed digital startup, is an authorized virtual insurance company that has since 2019 been offering commission-free Voluntary Health Insurance Scheme (VHIS) Standard Plan.[10] This direct-to-consumer trend poses a great threat to insurance agents and brokers.

Asian customers are increasingly tech-savvy and mobile, with ever-increasing expectations from their insurance providers on products, services, and pricing – at every significant stage of their lives. In addition, individual consumers are increasingly relying on mobile phones as a channel to interact with their financial services providers. There has been a gradual increase of mobile phone user penetration throughout the region, expected to reach nearly 60 percent by 2019. Insurtech companies can offer prospective digital customers their services via mobile phones and bypass traditional agents.

DEAL FLOWS

The convergence of the aforementioned macroeconomic trends has resulted in an influx of global intellectual capital and an appetite for investments. Insurtech funding reached $697 million in the fourth quarter of 2017 alone, and a total of $2.3 billion for the entire year – a 36 percent increase from $1.7 billion recorded in 2016. Industry incumbents and new entrants to the market have both pushed towards greater digitization.[11]

The Chinese startups again shined brightest, where there was a 44 percent increase in funding to 173 tech startups from 2016 to 2017. The listing of Zhong An, the first digital-only insurer, was a milestone for the industry. With its successful IPO in Hong Kong in September 2017 it raised $1.5 billion, making it the largest insurtech company in the world. One of Zhong An's initial founders is Ant Financial, an affiliate of Alibaba, which operates the world's largest digital payment platform. Its strength in technology and client resources supported Zhong An's successful product development of an e-commerce insurance product. Such investments in the development and adoption of new insurance technologies is expected to result in savings of around $300 billion per year for the Asian insurance industry by 2025.[12]

Over the past two years alone, there have also been significant deals and partnerships between insurance companies and insurtechs across Asian countries. The overarching goals of these deals are to improve the customer experience, create innovative products, gain market scale, and generate efficiencies. The highlighted partnerships in the figure on the next page are a testament to the fact that Asia is supportive of insurtech's wider adoption. We expect more deals – partnerships, mergers, or outright acquisitions – to further accelerate the seamless delivery of the insurance value chain to customers.

APAC INSURTECH DEALS LANDSCAPE (NOTEWORTHY DEALS AND PARTNERSHIPS IN THE REGION)

INDIA

- **2018 – Acko**, receives $12 million from **Amazon**, and launches passenger insurance for ride-hailing service, Ola
- **2018 – PolicyBazaar** lands $200 million in funding from **SoftBank** to work towards enhanced customer experience, seamless platforms, and a range of product offerings

CHINA

2018 – PingAn and **Sanofi** pharmaceuticals team up to advance chronic diseases management, optimize the use of big data within healthcare, and explore approaches to collaborative healthcare funding

2017 – Baidu Inc teams up with **China Life Insurance** to create a $2.12 billion investment fund to back advanced technology companies and improve mobile internet and AI

PHILIPPINES

- **2018 – PhilCare** releases the HeyPhil app, using AI to help customers efficiently consult with doctors and shop for health insurance on their mobile devices
- **2019 – MariaHealth** partners with VCs Core Capital and Gobi Partners, further expanding into the Philippines and enabling customers to easily compare what different healthcare and insurance brands have to offer

VIETNAM

- **2017 – GoBear Vietnam** launches travel insurance comparison product comparing 26 products covering 100 travel insurance plans
- **2018 – Liberty Insurance** teams up with Momo to offer its leading products, Cancer Ca$h and TravelCare on Momo's e-wallet

JAPAN

- **2018 – Rakuten** buys **Asahi Fire & Marine Private Insurance Co** to develop insurance products using customer data accumulated through e-commerce operations
- **2018 – Sompo Insurance** partners with LINE Financial, to create and provide a new type of smartphone-optimized insurance service

THAILAND

- **2017 – Muang Thai Insurance** introduces Muang Thai iDrive, a new smartphone app that gives precise driving style and behavior
- **2018 – Hearti** expands to Thailand, focusing on micro-insurance and on-demand policies such as time-specific insurance for phones, cameras, or luxury handbags for traveling

TAIWAN

- **2018 – Fubon P&C Insurance** to use e-certification for vehicle liability insurance so that customers can keep up with their coverage at all times on their mobile apps
- **2018 – Allianz Life** and **IBM** partner, using IBM Watson Conversation and IBM Cloud to create an advanced insurance chatbot

MALAYSIA

- **2018 – Allianz Malaysia** partners with **PolicyStreet** to provide better online access to its digital automobile, home, flight, and travel insurance products.
- **2017 – Fatberry.com** and **Tune Protect** partner, allowing Tune Protect to sell its motor, travel, and PA insurance using Fatberry.com's intuitive chatbot-like interface

SINGAPORE

- **2017 – IAG** launches innovation hub in Singapore, drawing on its global innovation network and entrepreneurial community to enhance customer experience
- **2017 – PRU Fintegrate** partners with Kyckr, using its global network that provides real-time access to 80 million legal entities in 88 countries, aiding in the regulatory space

HONG KONG

- **2019 – Bowtie** receives Hong Kong's first virtual insurance license and secures $30 million in funding backed by insurance giant, Sun Life, and Tencent founder, Pony Ma to offer affordable insurance products without the use of agents or banks
- **2018 – AIA Group** partners with **WeDoctor**, China's leading tech-enabled healthcare solutions platform, to provide innovative health offerings and protection solutions

Source: Capco Digital research and analysis

STATE OF PLAY - INCUMBENTS AND INSURTECHS

In an era where speed, convenience, and flexibility are no longer sources of differentiation, customer expectations, established players and newcomers alike have had to move up the learning curve quite rapidly. Banking and capital markets players have adjusted their digital agenda and placed innovation and technological transformation high on their list of priorities. The insurance industry is not far behind. It is collectively working on ways to accelerate their own transformations to keep pace with their consumers' changing needs and preferences.

However, the same questions that the early adopters of fintech faced in the banking and capital markets sectors, are now points of consideration for the insurance sector. At what rate should we pursue new technologies at the expense of our current working business models? Will it benefit our company and customers to be the first mover? Or is it a safer bet to be a fast follower? How should my organization approach and engage with emerging technologies?

What we observed in the earlier fintech wave was that the industry and emerging technologies could not be completely decoupled from one another. The key to having a meaningful technological impact and to unlocking the value of emerging technologies lies in the fusion between business and technology. This can only occur with a deep understanding of business, product, customer, and distribution channels. Insurers seem to be acutely aware of the potential of technology to disrupt their value chains but are still cautious in comparison to their banking peers. As of the third quarter of 2018, Asian insurers have spent $35.2 billion on technological advancements, up from $32.9 billion in 2016.

THE REGULATORY LANDSCAPE

While the insurtech innovation wave has been in sync with macroeconomic developments, regulatory bodies have also played an important role. With the guidance and encouragement from these local agencies, several countries in the region have experienced tremendous growth in insurance technologies and their industry's and nation's overall health. Over the past year, emerging and incumbent insurance companies have heeded the advice of their respective government regulators and followed their lead by partnering with technology firms to develop new products and simplifying the lives of insurance customers throughout the region.

Instead of pushing back and limiting the potential of these partnerships between insurance companies and technology firms, regulators such as the Hong Kong's Insurance Agency (IA) and Bank Negara Malaysia (BNM) – Central Bank of Malaysia – are now launching programs to encourage the establishment of insurtechs. The IA recently set up their Fast Track pilot scheme to expedite the application process required for insurance companies when attempting to use digital, online distribution channels. It has led the way by launching an insurance sandbox that permits Hong Kong insurers to work with technology firms to experiment with new insurtech applications for their business operations. The BNM has also recently held a summit at the Malaysia Institute of Insurance, where the authority's governor spoke about the country's plans to lower barriers to innovations and competition by establishing their own regulatory insurance sandbox. Both of these regulatory bodies have made great strides in advancing these partnerships by lowering existing barriers in a move that has become a necessary step in allowing the insurtech industry to thrive and provide customers with products they demand.

Other countries have taken a different route to boosting insurtech. By promoting the use of technology in their products and encouraging insurance firms to digitize, they have outlined a path for insurers to modernize their business strategy to help customers reap the benefits of insurance products of all kinds. The Monetary Authority of Singapore (MAS), the Philippines Insurance Commission (IC), and Korea's Financial Services Commission (FSC) have all announced plans to support the industry by promoting the development and application of new technologies in their products. The MAS has already gone as far as announcing a $20 million grant scheme that will encourage insurers to use AI, data analytics, and other advanced technologies in their products. The IC has targeted the Philippine's large community of unbanked customers by promoting the development of microinsurance products with awareness campaigns. Korea's FSC is now promoting the use of a number of different advanced technologies, such as self-driving, the Internet of Things, healthcare, and electric vehicles. As these countries continue to invest in the industry and promote such technologies, the APAC insurance industry can follow in the footsteps of the finance industry in capturing the attention of Asia's increasingly tech-savvy consumers.

APAC REGULATORY LANDSCAPE TIMELINE

SOUTH KOREA

August 2017 – South Korea's **Financial Services Commission** (**FSC**) releases a statement encouraging insurers to design innovative products for new technology applications, including self-driving and the Internet of Things (IoT)

HONG KONG

September 2017 – Hong Kong's **Insurance Authority** (**IA**) launched the insurtech sandbox, permitting insurers to work with technology firms and set up the Fast Track pilot scheme to expedite the application process for insurers looking to migrate business to digital distribution channels

SINGAPORE

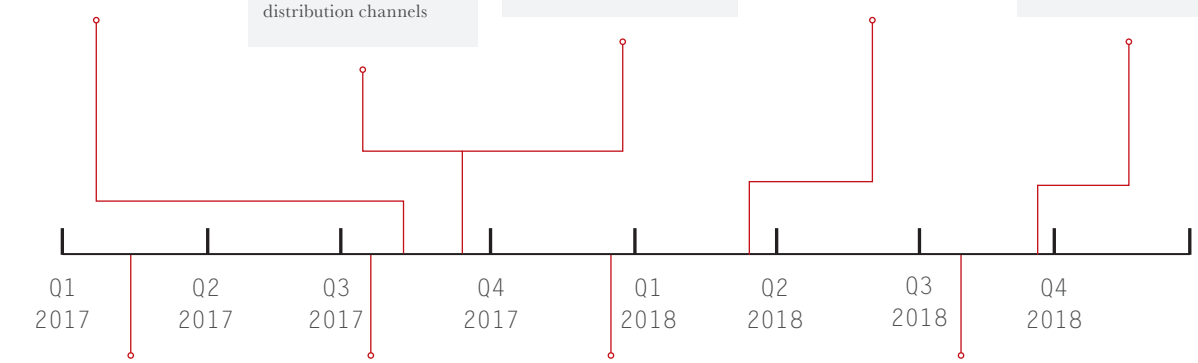
September 2017 – The **Monetary Authority of Singapore** (**MAS**) announced a series of measures to strengthen cybersecurity as well as to support the adoption of AI and data analytics among insurance companies through a $19.8 million grant scheme

PHILIPPINES

March 2018 – The Philippine's **Insurance Commission** (**IC**) is set to release a plan to increase digitization of the insurance industry including measures aimed at encouraging the sale and purchase of microinsurance products via digital channels

MALAYSIA

September 2018 – The governor of the **Bank Negara Malaysia** (**BNM**), spoke at a summit organized by the Malaysia Insurance Institute, announcing the country's plans to lower barriers to innovation and competition by establishing a regulatory insurance sandbox



TAIWAN

2017 – Taiwan's **Insurance Bureau** (**IB**) to take bolder steps to improve consumers' access to protection products by leveraging innovative products and technology

CHINA

July 2017 – China's **Insurance Regulatory Commission** (**CIRC**) issues revised draft of Measures Promoting Application of New Technologies in Insurance Industry to increase insurers' willingness to invest in informatization and provide authoritative guidance for application of new technologies

INDIA

December 2017 – India's **Insurance Regulatory & Development Authority** (**IRDAI**) creates team to study and promote wearable technology to be part of insurance policies

THAILAND

June 2018 – Thailand's **Office of Insurance Commission** (**OIC**) launches the Insurtech Centre of Thailand (ICT) for data collection, technology exchange, and insurance product development. The ICT will be a hub to integrate insurance firms and tech startups to drive the insurance industry forward

Source: Capco Digital research and analysis

STATE OF PLAY - INCUMBENTS AND INSURTECHS CONTINUED

To promote an industry as vast as insurance, the APAC nations must create the environment necessary to help ideas and knowledge grow. By forming teams and establishing innovation hubs that foster the growth of the industry, some government authorities have taken the first steps in that regard. The Insurance Regulatory & Development Authority of India (IRDAI) and Thailand's Office of Insurance Commission (OIC) have started the process of creating an environment that promotes forward thinking and knowledge exchange. The IRDAI has created a team dedicated to studying how wearable technologies can be used in risk assessment, risk improvement, and policy design. They also intend to advance the life insurance sector by using wearable devices to analyze fitness and healthy lifestyle. The OIC has gone as far as building a center that is fully dedicated to the advancement of the country's insurance industry with a focus on research, development of technologies, increasing accessibility of knowledge amongst the public, and connecting regulators with startups.

As these prominent APAC nations take measures to remove regulatory barriers, facilitate innovation, and establish centers of innovation, it has become clear that APAC's growing number of tech-savvy customers can only benefit from the modernization of the industry. The application of technology in insurance has already been a success in Europe and North America, but now regulatory bodies in APAC nations are following suit and listening to the needs of their constituents.

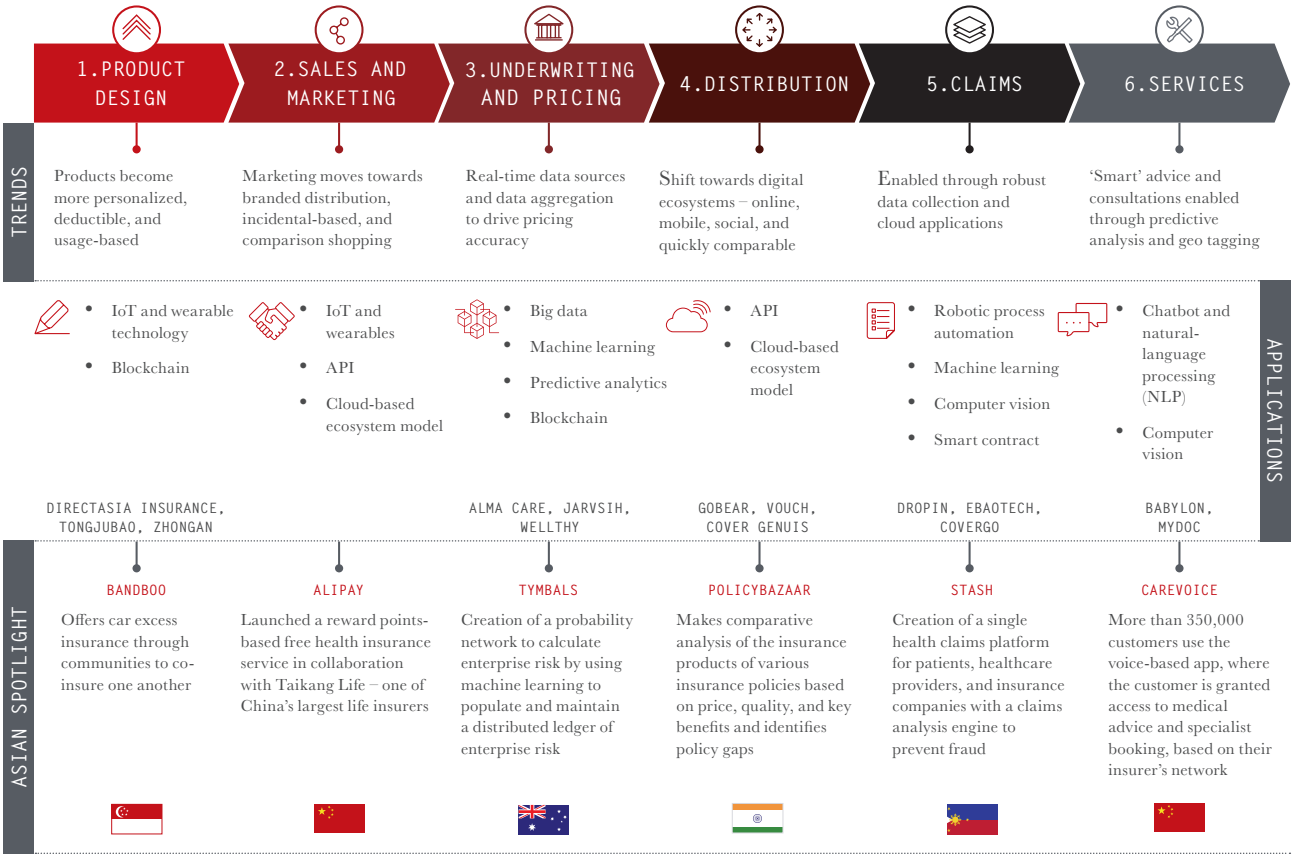
INSURTECH APPLICATIONS ALONG THE VALUE CHAIN

Insurance is a data-driven business. The industry will require even more sophisticated automation and technical expertise to achieve efficiency. Amassing data and subsequently tailoring offerings to the needs of individual and commercial customer segments are especially crucial.

We believe that the insurance opportunities offered by digitization and technologies that acquire, manage, and process data will be immense. The figure below presents examples of the ways in which technology is disrupting the industry.

By exploring ways to promote and support innovation and the sharing of knowledge within Asia's insurtech industry, various in-country regulators have created a climate of forward thinking that can only help APAC catch up with its western counterparts – and possibly even surpass them in certain instances.

THE 'SUPER CHARGED' INSURANCE VALUE CHAIN



Source: Capco Digital research and analysis

TECH TRENDS SHIFTING CONVENTIONAL TIDES

We now examine the following top insurtech trends positively impacting – and even revolutionizing – the industry across the region. In some cases, companies adopt the cutting edge technologies pioneered by western innovators whilst customizing them for their respective local markets, while in other cases they develop their own technologies.

INSURTECH TREND 1: OPEN APIS AS AN ACCELERATOR

Trend: APIs (application programming interface) have accelerated digital and technological agendas within developed financial markets. While APIs were initially seen as a threat to financial providers, they are now seen as enablers to help create new and attractive customer experiences.

Implications: the growth of the ecosystem services has resulted in traditional insurers losing market share over the last few years. Customers now demand an inter-connected service marketplace that extends beyond insurance products, such as financial planning, home security, or car maintenance. APIs help address this lack of insurer flexibility by allowing for extensive sharing of information and services with third parties and vendors. Integration with other product extensions allows insurers to create more touchpoints and provide better customer experience, create new digital products, increase sales and distribution, and eventually move into creating disruptive business models.

Increased competition is coming in the shape of Big Tech and global players. Alibaba and Tencent are using their digital reach to create a fully digital-only insurance experience. Notably, the automobile industry is forging ahead to provide a 'vehicle-to-everything' platform. Volkswagen and Tesla have started to offer insurance with a car purchase, and Ford is working with Autonomic to create an open platform Transportation Mobility Cloud to build infrastructure communications for cities. Success will belong to those who control the customer interface and its data.

What is next: open APIs allow various insurance companies' channel partners to integrate their services seamlessly across the customer journey. This will be a continuing trend as open APIs create a win-win situation for all parties. Additional values are provided to the customer and the channel partners, while at the same time helping the insurance companies to expand their reach to new potential customer pools, join other ecosystems (e.g., Google Nest), and create their own API platform that can offer opportunities for further growth.

A case in point is Ping An insurance, which has built an API platform that allowed the company to offer advanced auto claim technology to small and medium-sized insurance companies at an affordable price.

Improving the insurer's distribution channels is only potential source of benefit. Ultimately, open APIs have the potential of transforming the entire insurance value chain via the free-flow of customer information.

INSURTECH TREND 2: POSITIVE BEHAVIORAL REINFORCEMENT VIA IOT

Trend: altering people's behaviors without limiting their options or impacting them financially yields powerful results. Public and private sectors alike are looking at ways to nudge customers towards healthier lifestyles, with an eye towards promoting better outcomes for individuals and the society at large.

Implications: a well-established use-case is the black box insurance for the automobile. With the motion tracking feature in smartphones and telematics, this has promoted safe driving by rewarding a lower premium to drivers who demonstrate safe driving practices. With the recent development of wearables and smart devices, the approach could be leveraged in other fields of insurance. Wearables and smart devices that monitor health signs will give richer data on individuals, with a vast potential for insurers to leverage this information to customize the policy and reward customers.

What is next: IoT technologies will continue to offer both insurers and consumers considerable advantages – from improving the accuracy to price risk to lowering insurance premiums. A case in point is the emergence of healthtech companies, who create enormous opportunities for insurers. With the enormous amount of health, fitness, and lifestyle data maintained by these

innovators, partnerships with healthtech players can generate significant advantages for both parties. This is not limited to healthtech companies. Other insurtech companies monetize their user-base data and have thus developed a sustainable revenue stream through cooperating with the insurers.

Possessing rich data and deep understanding of users can help in the development of highly personalized products. In addition, these technologies offer the means to track positive behaviors, such as healthy lifestyles, good driving habits, and desirable building maintenance, and reward them with lower premiums. This will translate into deeply engaged customers and increased customer loyalty.

INSURTECH TREND 3: CLOUD AND BLOCKCHAIN ENABLE PERSONALIZATION

Trend: interoperability, as applied to the healthcare industry, emphasizes the importance of effective use of data in healthcare. This results in improving processes and patient care, thus generating more proactive treatment plans. Interoperability will pave the way for the adoption of data-driven operating models in the healthcare and insurance industries.

Implications: sharing medical data is not only helpful to patients to receive the best medical advice and services, it also helps insurers have greater visibility about the medical background of patients. In the future, insurers will be able to provide a more

OPEN APIS USE-CASES ACROSS THE INSURANCE VALUE CHAIN

COMPANY	AXA SINGAPORE (SINGAPORE)	ZHONGAN (CHINA)
BUSINESS DRIVERS	• Provide insurance-as-a-service to fintech partners, allowing customers to access AXA's insurance products and thus increasing cross-selling opportunities • Respond to the initiative from the Monetary Authority of Singapore (MAS) for players in the financial industry to publish open APIs	• Deepen cooperation with smaller companies within a specialized ecosystem of partners unable to develop their own platform • Offer insurance-as-a-service to partners with access to niche customer pools
USE-CASE	• Opened up transactional API and partnered with SATS Ltd; integrating AXA within its Ready to Travel app, which allows users to get seamless insurance coverage while planning for their trips • Available for home, travel, and car insurance, with health and life offerings in the pipeline	• Zhong An opened up their APIs to offer customized insurance solutions for partners in various industries: – DXY.cn, an online community of physicians, offers bonus coverage and discounted premiums for patients undergoing regular sugar level blood tests – Xiaozhu.com, a short term apartment sharing platform, offered home occupancy and accident insurance to homeowners and tenants – Mogujie, a social commerce website, offers personalized credit insurance with rates adjusted to spending and payment records
BENEFITS	• Expand distribution capabilities via partnerships with a variety of channels • Improve the customer experience	

TECH TRENDS SHIFTING CONVENTIONAL TIDES CONTINUED

IOT USE-CASES FOR BEHAVIORAL REINFORCEMENT

COMPANY	QUEALTH (U.K.)	HEALTH2SYNC (TAIWAN)	BEAM DENTAL (U.S.)	JARVISH (TAIWAN)
BUSINESS DRIVERS	• Customers using multiple sources of fitness and well-being apps and devices to track their behavior • No centralized platform for storing and analyzing these health and fitness customer	• Glucometers are not connected to smartphones • No easy way to track blood level with existing glucometers in the market	• Conventional dental insurance does not help prevent costly dental problems • Unable to track the customer oral care behavior to personalize the policy	• Over 400 million motorcyclists in Asia with risks of fatality 20 times higher than car drivers and occupants • Insurance is expensive for riders • Pricing depends on demographics with no input from personal driving behavior
USE-CASE	• Aggregates health and lifestyle data and scoring of the risk of developing the Big Five preventable lifestyle diseases • Score is available as an API	• Connect glucometers with mobile app via phone dongle • Sync up precise blood sugar data	• Uses a smart toothbrush that tracks how users brush their teeth • Offer discount on premium to reward good oral care behavior	• Monitor rider behavior by sensors in the smart helmet • Evaluate the risk from tracked behavior data
TECHNOLOGY	• Smart device & IoT • Big data • Machine learning	• Smart device and IoT	• Smart device and IoT	• Smart device and IoT • Big data • Machine learning
BENEFITS	• Provide powerful risk analytics and prediction platform on assessing an individual's health • Insurers can access and build out their own apps and services via the data from API	• Track a user's blood sugar in a data-rich context • Enable insurers to reward good behavior (via tracked blood sugar level) by giving a premium discount • Incentivize patients to better control their blood sugar levels	• Beam's insurance plan is 10 percent - 25 percent cheaper than competitors • Ability to offer personalized policy according to data collected • Motivate individuals to improve oral care by lower premiums	• Enable insurers to offer customized policies ranked by evaluated risk levels from the tracked driver data • Promote safe driving behavior and reduction of the number of fatal accidents

personalized policy via predictive analytics of medical records, including family medical history. Interoperability between healthcare providers can help prevent the development of long-term illness and costly claims, thus promoting well-being of all patients in the long term.

Furthermore, the conventional approach for insurers to assess the risk and price a healthcare policy relies predominantly on health snapshots obtained at the single point of time when customers onboard. The sharing of medical data and fitness data will allow insurers to have a comprehensive view of the customer's condition and lifestyle, in a continuously fluid fashion.

Other stakeholders, such as researchers, can also utilize the rich data available to foster a data-driven healthcare ecosystem.

What is next: insurers now have the opportunity to play a very significant role in the healthcare ecosystem. They can either establish and lead in creating a unique solution or enter into partnerships and alliances with emerging players. The next evolution of insurance will be primarily driven by data exchange and sharing between stakeholders in the ecosystem – from new customer acquisition, fraud prevention, predictive analytics on risk and pricing, to instant claims processing. Being isolated from the ecosystem and missing this considerable opportunity results in a loss of competitive advantage in the long run.

INSURTECH TREND 4: AI, MACHINE LEARNING, AND IOT LEAD TO AUTOMATION

Trend: recent advancements in blockchain and AI have brought about a high degree of automation that can profoundly influence thet insurance industry operations. Machine learning has advanced greatly in recent years, particularly in deep learning and image recognition. By training neural networks with a vast number of sample photos, AI technology can be taught to recognize objects as well as details within images. In the property insurance context, AI can assess the level of damage, down to the parts impacted, in the event of a car accident. This offers the potential to replace some human activities for claim investigations and verification, e.g., the level of damage of a car and its parts in a vehicle accident. This makes it possible to replace some manual activities in claim investigations and verification used to be done by humans. Natural language processing (NLP) fuels the evolution of chatbots, which are now becoming more user-friendly and human-like. Chatbots are starting to handle more complicated customer service scenarios – Google Duplex can answer phone calls as humans can. These AI technologies are made accessible as a cloud service from providers such as AWS (Amazon Web Services) and Google Cloud.

The proliferation of IoT technology may also advance automation. Insurers will be able to monitor homes and vehicles in real-time, and if there is a catastrophe resulting in a large-scale claim, the insurer can mobilize satellites, drones, and weather open data immediately to prepare for the claims with matched policyholders. SkyClaim, a service developed by Skymatics, offers crop damage analysis reporting solutions for crop insurance. By using surveying drones and computer vision technology, it helps the insurers and the policyholders to easily determine the crop damage and yield loss.

Implications: claims management plays a very significant role in the customer experience of an insurance product. Further, rather than employing complicated claim forms manually filled by the customers and going into a lengthy reimbursement process, technology-advanced insurers are automating this by implementing smart contracts, open data, machine learning, and IoT technology. Traditional claims management will likely focus on more complicated and unusual or disputed claims with technology helping the negotiation, investigation, and settlement.

What is next: automation in claims management will be moving from cost and resource savings to enhancing customer experience by enabling instant and seamless claims process.

TECH TRENDS SHIFTING CONVENTIONAL TIDES CONTINUED

With the rising population of millennials and tech-savvy users, using AI for customer service will be a core feature demanded. Insurers should either start developing their own capacity in AI or seeking the right technical partner to deliver the new customer experience.

Progress in IoT and blockchain will also build the foundations for smart contacts, enabling fully automated claims management. With more innovators in the blockchain field starting to introduce real-world data to the blockchain, insurers should consider the possibility of developing new products associated with the blockchain and offer completely automated claims management via smart contracts. In the future, the FNOL (first notice of loss) contact will not be made by the customer but triggered automatically by smart devices and smart contract monitoring open data.

INSURTECH TREND 5: BLOCKCHAIN AS THE FRAUD POLICE

Trend: the immutable nature of blockchain ensures that the records stored in the chain are almost certain to be genuine. A well-understood application of this nature of blockchain is cryptocurrencies, such as bitcoin. Transactions are stored and locked in the blockchain, and it is impossible for anyone to alter them; hence the integrity of the entire system can be generally ensured.

Implications: it is estimated that about 10 percent of global compensation claims for property damage or personal accidents are fraudulent, meaning that genuine customers end up paying more for their premiums. Using the records from blockchain can improve the management of fraud risk and result in lower premiums.

There are current use-cases of blockchain that can help to prevent insurance fraud by improving the provenance of property and the reliability of the tracking records in the supply chain. In addition, personal identity authentication mechanisms via smart contracts are now empowering insurers to verify the identity of those making claims. With these extra layers of verified information from the chain, insurers now can better control fraud risk and reduce the costs associated with fraudulent claims.

What is next: fighting insurance fraud will be a continuous effort and blockchain offers the prospect of perfect data integrity; it will be part of the toolkit used to examine the reliability of claims via innovative solutions in the market.

Meanwhile, the amount of data available in the blockchain will continue to grow, the benefits of which go beyond just combating fraud. With the complete history of customers, such as the health and fitness data in the medical chain, insurers will be able to undertake predictive analyses and accurately price their policy for each individual. This underscores the concepts discussed above on positive reinforcement and inter-operation of technologies like AI, blockchain, and the IoT. These emerging technologies can reshape the insurance industry landscape.

CLOUD AND BLOCKCHAIN USE-CASES FOR PERSONALIZATION

COMPANY	PING AN HEALTH CLOUD (CHINA)	GEM (U.S.)	MEDREC (U.S.)
BUSINESS DRIVERS	• Patient's data is scattered among different organizations, making it difficult for them to access past records	• Organizational data silos rendering insurance value chains inefficient	• Lack of centralized repositories to store and handle medical records
USE-CASE	• PingAn Health Cloud members can, with the patient's permission, access their health records instantly, including information from providers and insurers • Offers health risk assessment, smart self-diagnosis, and triage using the data housed in the cloud	• GemOS allows patients, providers, and insurers to securely view a patient's health timeline in real-time, improving speed and transparency throughout the claims process • Adds security via permissioned blockchains in which patients control access and there is a shared ledger system in which every new change is recorded	• Indexed medical records on the blockchain linking access to the patient's medical records across multiple doctor databases • All relevant parties can access a patient's health records instantly with the patient's permission
TECHNOLOGY	• Cloud	• Blockchain (Ethereum) • Smart contracts	• Blockchain (Ethereum) • Smart contracts
BENEFITS	• Huge amount of aggregated data can be used to support the underwriting and pricing of health insurance products • Customers can enjoy personalized policies by sharing medical backgrounds with insurance companies • Healthcare data enables effective health risk assessments to identify diseases in the early stages of an illness and reduce claims	• Quick verification and reimbursement of health claims • Healthcare data enables effective health risk assessment to identify diseases in early stages and prevent claims	• Decentralized network allows for sensitive medical data to be shared via blockchain technology securely • Aggregated and anonymized metadata could be obtained for predictive analytics by acting as miner to verify the exchange of information

TECH TRENDS SHIFTING CONVENTIONAL TIDES CONTINUED

AI, MACHINE LEARNING AND IOT USE-CASES FOR AUTOMATION

COMPANY	AXA'S FIZZY (FRANCE)	LEMONADE (U.S.)	ZHONG AN (CHINA)
BUSINESS DRIVERS	• Written confirmation by the airline is required for claiming compensation for delayed flights • Verification of the delayed flight takes time and manpower	• Tech-savvy customers expect an instant response, and it is costly to maintain a well-trained and responsive customer service team to be available 24/7 to assist customers	• With the innovative insurance products developed by ZhongAn, there is a considerable amount of claims submitted • Fraudulent and exaggerated claims with photoshopped images
USE-CASE	• Offer instant and automatic payment if a customer's flight is delayed for more than two hours	• Submit claims and promptly receive payouts via chatbot • Guiding customers step-by-step throughout the claims process without involving human customer service	• Phone screen warranty – determine if the screen is in good condition or broken from the photo sent by the customer • Automobile insurance – determine the damage to a car from photos and estimate the loss from the photo sent by the customer
TECHNOLOGY	• Blockchain (Ethereum) • Smart contract	• Chatbot / NLP	• Computer vision • Machine learning
BENEFITS	• Offer a fully automated customer experience during the claims process • Compensation decision is triggered by external data (global air traffic databases), which underscores the improved credibility of the service • Eliminate the resource needed to handle the claim	• Makes the process simpler and faster, thus improving the customer experience • Built-in anti-fraud algorithms • Augment the customer services team • Cost saving	• Reduce the resource and time needed for investigation to process a claim • Prevent fraud by detecting if the image is manipulated • Improve the customer experience

BLOCKCHAIN USE-CASES FOR FRAUD PREVENTION

COMPANY	CIVIC (U.S.)	EVERLEDGER (U.K.)	STATWIG (INDIA)
BUSINESS DRIVERS	• Medical identity thieves make claims on other peoples' policies, resulting in financial losses to insurers and customers	• Lack of data on luxury assets resulted in risk of scamming an insurer	• Logistics records can be easily manipulated • Insurers have difficulty in accessing and validating proof of loss of the shipments and process claims in cargo insurance
USE-CASE	• Authentication data shared with the requesting party with the user's approval • Alerts users via a push notification when their identity is being used at the time of the transaction	• Recording the lifecycle of a diamond using the Diamond Time-Lapse Protocol on blockchain • Shared records visible across the industry participants	• Provide real-time, tamper-proof, end-to-end tracking for shipments • Insurers are able to track shipments for proof of losses and offer risk reduction services
TECHNOLOGY	• Blockchain (Ethereum) • Smart contracts	• Blockchain (Ethereum) • Smart contracts	• Blockchain (Ethereum) • Smart contract • IoT
BENEFITS	• Insurer can easily validate whether the identity of the person submitting the claim is correct • Protect users against identity theft	• Prevent fraud in luxury property insurance • Manufacturers, sellers, and consumers of the diamond are stored in the blockchain trackable by the insurer; it is very challenging to commit fraud on such well-tracked assets	• Prevent fraud in cargo insurance claims

CONCLUSION

The growth of the insurance industry in the Asian region is clearly linked to macroeconomic factors, as well as continued investment in the region. The demographic composition of Asian countries is rapidly changing. The rising purchasing power of the middle class in urbanized areas with relatively low market penetration for insurance is a powerful growth driver in Asia. In addition, the rising millennial generation fuels innovation. The tech-savvy population increases propensity for early and easy adoption of digital solutions.

Insurtech is rapidly transforming markets in the West, and Asia is fast reaching its inflection point and will be the next catalyst for transformation of the industry. Insurtech has contributed significantly to global premium growth in 2017, and we expect this trend to continue, creating outsized opportunities for traditional insurers as well as new digital insurance companies and Big Tech companies.

Increased competition in APAC is expected among incumbents and new players. Consequently, a solid understanding of the unique landscapes of the fast-growing markets in Asia and the agility to adapt to new trends via proprietary technology investment and partnerships will be critical to the success of insurers.

The unique macroeconomic dynamics of the Asian region as well as insurtech ecosystem innovation are being further aided by supportive governments and improved regulations. With the continued rollout of various initiatives by insurance governing bodies, the industry transformation will continue.

For these reasons, we expect further transformation of the traditional insurance industry in Asia. Relationship-based sales, currently the dominant approach in the region, will increasingly be characterized by disintermediation as customers continue to gain greater transparency on pricing and coverage ushered in by new technologies. Insurers will increasingly face the challenge of creating new value propositions and providing unique customer experiences. The strategic imperative rests on the insurers becoming adept and agile to harness the potential of insurtech, which will then enable them to stay ahead of the curve.

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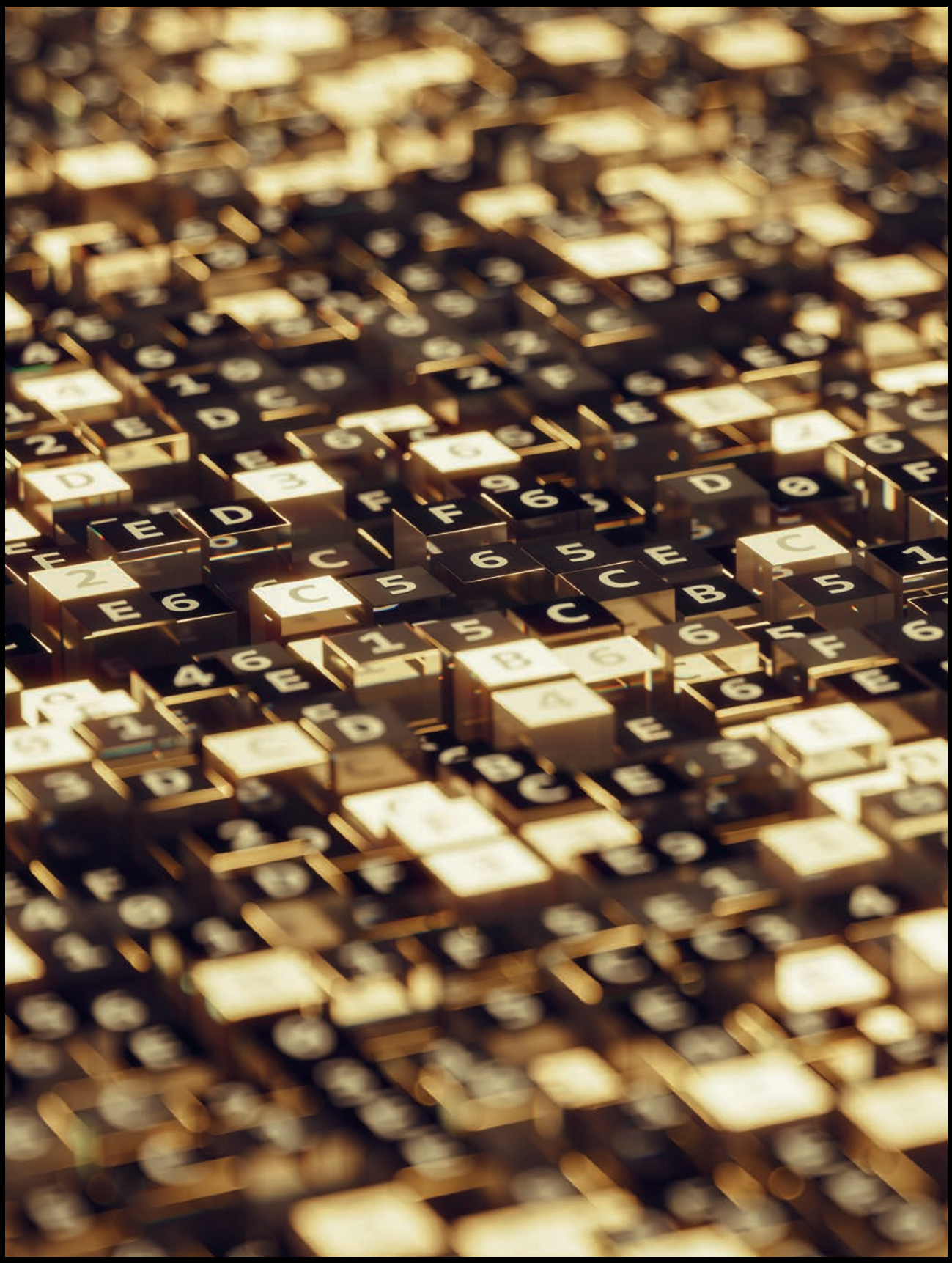

NAVIGATING THE CYBERSECURITY REGULATORY LABYRINTH

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April 2019

SUMMARY

In today's regulatory and compliance marketplace, there is no industry-adopted application that can provide a map of all regulatory requirements. As a result, organizations are taking a 'bottom-up approach' when it comes to cybersecurity – by first building policies and procedures, then mapping them upwards to the requirements. The result is a complex, time-consuming program that makes the regulatory compliance effort excessively complicated.

In this piece, we share how businesses can make sense of this regulatory and compliance requirements labyrinth and devise an integrated cybersecurity program.

There are several State and US federal laws restricting access to and use of sensitive and non-public information:

NEW YORK DEPARTMENT OF FINANCIAL SERVICES 23 NYCRR 500 (DFS 500)

This regulation is designed to promote the protection of customer information and the information technology systems of regulated entities. This regulation requires each company to assess its specific risk profile and design a robust program that addresses its risks. Senior management must take this issue seriously and take responsibility for the organization's cybersecurity program and file an annual certification confirming compliance with these regulations. A regulated entity's cybersecurity program must ensure the safety and soundness of the institution and protect its customers.

GRAMM-LEACH BLILEY ACT (GLBA)

Title V, Subtitle A of the Gramm-Leach-Bliley Act (GLBA)[1] governs the treatment of non-public personal information about consumers by financial institutions. Section 502 of the subtitle, subject to certain exceptions, prohibits a financial institution from disclosing non-public personal information about a consumer to non-affiliated third parties, unless (i) the institution satisfies various notice and opt-out requirements, and (ii) the consumer has not elected to opt out of the disclosure. Section 503 requires the institution to provide notice of its privacy policies and practices to its customers. Section 504 authorizes the issuance of regulations to implement these provisions.

FFIEC CYBERSECURITY ASSESSMENT TOOL (CAT)

Considering the increasing volume and sophistication of cyber threats, the Federal Financial Institutions Examination Council (FFIEC) developed the Cybersecurity Assessment Tool (CAT), on behalf of its members, to help institutions identify their risks and determine their cybersecurity preparedness. The assessment provides a repeatable and measurable process for institutions to measure their cybersecurity preparedness over time. The assessment incorporates cybersecurity-related principles from the FFIEC Information Technology (IT) Examination Handbook and regulatory guidance, and concepts from other industry standards, including the National Institute of Standards and Technology (NIST) Cybersecurity Framework.

SARBANES - OXLEY 404 (SOX)

Under Section 404 of the act, management is required to produce an 'internal control report' as part of each annual Exchange Act report. See 15 U.S.C. § 7262. The report must affirm "the responsibility of management for establishing and maintaining an adequate internal control structure and procedures for financial reporting." 15 U.S.C. § 7262(a). The report must also "contain an assessment, as of the end of the most recent fiscal year of the company, of the effectiveness of the internal control structure and procedures of the issuer for financial reporting." Under Section 404, management is required to:

- Assess both the design and operating effectiveness of selected internal controls related to significant accounts and relevant assertions, in the context of material misstatement risks
- Understand the flow of transactions, including IT aspects, in enough detail to identify points at which a misstatement could arise
- Evaluate company-level (entity-level) controls, which correspond to the components of the COSO framework (The Committee of Sponsoring Organizations of the Treadway Commission - a joint initiative to combat corporate fraud)
- Perform a fraud risk assessment
- Evaluate controls designed to prevent or detect fraud, including management override of controls
- Evaluate controls over the period-end financial reporting process
- Scale the assessment based on the size and complexity of the company
- Rely on management's work based on factors such as competency, objectivity, and risk
- Conclude on the adequacy of internal control over financial reporting

PAYMENT CARD INDUSTRY DATA SECURITY STANDARD (PCI DSS)

The PCI DSS specifies twelve requirements for compliance, organized into six logically related groups called 'control objectives.' These six groups are:

1. Build and maintain a secure network and systems

2. Protect cardholder data

3. Maintain a vulnerability management program

4. Implement strong access control measures

5. Regularly monitor and test networks

6. Maintain an information security policy

Each version of PCI DSS has divided these six requirements into several sub-requirements differently, but the twelve high-level requirements have not changed since the inception of the standard. Each requirement/sub-requirement is additionally elaborated into three sections:

1. Requirement declaration: defines the main description of the requirement. The endorsement of PCI DSS is done on the proper implementation of the requirements

2. Testing processes: the processes and methodologies carried out by the assessor for the confirmation of proper implementation

3. Guidance: explains the core purpose of the requirement and the corresponding content which can assist in the proper definition of the requirement

CODE OF FEDERAL REGULATIONS (12 CFR 30 APPENDIX E)

Office of Comptroller of Currency (OCC) established standards for recovery planning by certain large insured national banks, insured federal savings associations and insured federal branches. This regulation requires each covered bank to develop and maintain a recovery plan specific to that covered bank and appropriate for its size, risk profile, activities and complexity, including the complexity of its organizational and legal entity structure.

DATA BREACH NOTIFICATION LAWS IN ALL 50 STATES

Every state in the union has a law associated with data breach and notification. Each state has developed their requirements, but, each state requires an agency, person or business that conducts business and owns or licenses computerized 'personal information' to disclose any breach of security (to any resident whose unencrypted data is believed to have been disclosed). The time mandated for notification of the breach to impacted residents differs state by state.

HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT (HIPAA) PRIVACY RULE AND SECURITY RULE

Whereas the HIPAA Privacy Rule deals with Protected Health Information (PHI) in general, the HIPAA Security Rule (SR) deals with electronic Protected Health Information (ePHI), which is essentially a subset of what the HIPAA Privacy Rule encompasses.

GENERAL DATA PROTECTION REGULATION (GDPR)

General Data Protection Regulation (GDPR) presents a single set of requirements for EU Member States that covers personal data of EU citizens and is attempting enforcement on organizations that obtain and handle EU citizens' personal information, even if they don't have a presence in the EU. However, currently, there has been no appointment of an authority in the U.S. to oversee compliance with GDPR.

Both GDPR and U.S. privacy protection laws support transparency, privacy protection and information and cybersecurity measures.

There are also a few cybersecurity frameworks that can be used for the development, implementation and sustainment of an enterprise cybersecurity program. The following are the three most common in use:

NIST CYBERSECURITY FRAMEWORK (CSF)[1]

The United States depends on the reliable functioning of critical infrastructure. Cybersecurity threats exploit the increased complexity and connectivity of critical infrastructure systems, placing the nation's security, economy, and public safety and health at risk. Like financial and reputational risks, cybersecurity risk affects a company's bottom line. It can drive up costs, impact revenue, harm an organization's ability to innovate and threaten customer interaction. Cybersecurity can be an important, amplifying component of an organization's overall risk management.

To better address these risks, the Cybersecurity Enhancement Act of 20141 (CEA) updated the role of the National Institute of Standards and Technology (NIST) to include identifying and developing cybersecurity risk frameworks for voluntary use by critical infrastructure owners and operators. Through CEA, NIST must identify "a prioritized, flexible, repeatable, performance-based, and cost-effective approach, including information security measures and controls that may be voluntarily adopted by owners and operators of critical infrastructure to help them identify, assess, and manage cyber risks." This formalized NIST's previous work in developing Framework Version 1.0 under Executive Order (EO) 13636, 'Improving Critical Infrastructure Cybersecurity' (February 2013), and guided future framework evolution. The framework that was developed under EO 13636, and continues to evolve according to CEA, uses a common language to address and cost-effectively manage cybersecurity risk based on business and organizational needs without placing additional regulatory requirements on businesses.

SANS CIS CRITICAL SECURITY CONTROLS (CSC)[2]

The CIS Critical Security Controls are a recommended set of actions for cyber defense that provide specific and actionable ways to stop today's most pervasive and dangerous attacks. A principal benefit of the controls is that they prioritize and focus on a smaller number of actions with high pay-off results. The controls are useful because they are derived from the most common attack patterns highlighted in the leading threat reports and vetted across an extensive community of government and industry practitioners. Created by the people who know how attacks work – NSA Red and Blue teams, the U.S. Department of Energy nuclear energy labs, law enforcement organizations and some of the nation's top forensic and incident response organizations - to answer the question, 'what do we need to do to stop known attacks?'. The group of experts reached a consensus producing the most current controls today. The controls need to be updated based on new attacks that are identified and analyzed to remain current and mitigate future attacks.

The controls take best-in-class threat data and transform it into actionable guidance to improve individual and collective security in cyberspace. Too often, 'bad guys' are better organized than the 'good guys.' The controls provide a means to turn that around.

ISO 27K

The ISO/IEC 27000-series (also known as the 'ISMS Family of Standards' or 'ISO27K' for short) comprises information security standards published jointly by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

The series provides best practice recommendations on information security management - the management of information risks through information security controls - within the context of an overall information security management system (ISMS), similar in design to management systems for quality assurance (the ISO 9000 series), environmental protection (the ISO 14000 series) and other management systems.

WHAT TO DO

So, here are the questions:

- Which laws and regulations do you need to comply with?
- If you are in compliance with some, are you in compliance with all?

Whether you do or do not fall under the requirements of DFS 500, it is important to note that among all federal and state regulatory requirements, DFS 500 is the most stringent. However, DFS 500 provides some latitude by using phrases such as:

- "qualified individual" – but does not define what constitutes a qualified individual
- "effective alternative compensating controls" – but does not define what effective alternative compensating controls are

One could argue that these vague phrases provide organizations with an out because of the subjectivity over the meaning of qualified individual and effective alternative compensating controls.

WHAT WE DID

To understand if complying with the most stringent of regulations positions you to be in compliance with most of the other applicable regulatory requirements, we performed the following three actions:

1. Compiled a list of cybersecurity program leading practices

2. Identified the leading practices that were addressed in State and Federal regulations

3. Identified the leading practices that were covered by the most used cyber frameworks

RESULTS

The table below lists the cybersecurity program leading practices and identifies the regulations that reference/require them as well as identifying the leading practices that are embodied in cyber frameworks:

- An '**X**' in the cell indicates that there is a reference/ requirement in the regulation and framework
- A cell that is **GREY** indicates that the leading practice is not referenced/required in the regulation and framework

CYBERSECURITY PROGRAM LEADING PRACTICES	DOMESTIC REGULATIONS								EU	FRAMEWORKS		
	DFS 500	GLBA	FFIEC CAT	SOX 404	PCI DSS	12 CFR 30 App E	STATE BREACH LAWS	HIPAA	GDPR	NIST CSF	SANS CSC	ISO 27K
Cybersecurity policy	X	X	X		X			X		X	X	X
Named CISO or equivalent	X	X	X					X	X	X		X
Penetration testing & vulnerability assessments	X	X	X		X	X				X	X	
Red teaming exercises											X	
Continuous vulnerability assessment and remediation					X					X	X	
Maintenance, monitoring, and analysis of audit logs	X	X	X	X				X		X	X	
Access privileges	X	X	X	X	X	X	X	X	X	X		X
Application security	X	X	X	X	X					X		X
Risk assessment	X	X	X	X		X		X	X	X	X	X
Cybersecurity personnel & intelligence	X	X	X							X		X
Third party information security policy	X	X	X		X	X		X		X		X
Multi-factor authentication	X		X							X		
Data retention policy	X	X			X	X	X		X	X	X	
Training & monitoring	X	X	X		X	X		X		X	X	
Encryption of NPI	X	X	X		X	X	X	X	X	X	X	X
Incident response plan	X	X	X			X				X	X	X
Inventory of devices	X	X	X						X	X	X	X
Inventory of software	X	X	X							X	X	X
Secure configs for infrastructure and mobile devices	X		X		X					X	X	
Malware defenses		X	X		X					X	X	
Wireless access control	X	X	X							X	X	X
Data recovery capability	X	X	X	X	X	X	X	X	X	X	X	X
Security provisioning of network devices			X		X					X	X	X
Control of network ports, protocols, and services	X	X	X		X					X	X	X
Controlled use of administrative privileges			X	X						X	X	X
Boundary defense			X							X	X	X
Account monitoring and control		X	X	X				X		X	X	X
Data protection	X	X	X	X	X	X	X	X	X	X	X	X
Secure network engineering	X		X							X	X	X
Physical security	X	X	X					X		X		X
Business continuity plan	X	X	X			X				X		X

WHAT WE ARE SEEING IN THE INDUSTRY IS THE FOLLOWING:

- Increased legislation at the federal and state levels regarding the definition, handling and use of Non-Public Information (NPI)
- Increased foreign regulatory requirements putting greater control around the use of NPI in the hands of its owner
- All provide 'suggested controls' but state that if suggested control is not feasible, then a compensating control needs to be introduced
- Does not state what a compensating control is
- Interpretation is left up to the organization
- Confusion reigns as to which regulation(s) to follow

CAPCO'S VIEW

- All laws and regulations are focused on the protection of the consumer's private or Non-Public Information
- While encryption provides the most secure means of protecting NPI, it should not be solely relied upon, but should be combined with:
  - » Identity access management
  - » Identity detection system
  - » Multi-factor authentication
  - » Monitoring and surveillance
- Obtain legal counsel's opinion as to what laws and regulations are applicable to your organization
- Ensure that your incident response procedures include communication plans to notify impacted parties in the event of a data breach within required timeframes that include:
  - » Having pre-written notification statements
  - » Identifying who is responsible for notifying impacted clients
  - » Identifying who is responsible for notifying appropriate authorities
- Constantly review and challenge controls around NPI
- Following the NIST CSF framework should position you to be in compliance with the current multitude of regulatory issuance requirements around the protection of NPI and establishment of a viable cybersecurity program that will meet the expectations of the examiner and auditors alike

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DIGITAL CHANNELS: HOW WEALTH MANAGERS WILL KEEP AHEAD OF THE CURVE

AUTHOR:
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July 2019

WHAT CAN INTEGRATED DIGITAL CHANNELS DO FOR WEALTH MANAGEMENT?

Challenger banks and fintechs are no longer just startups struggling for recognition. In recent years, they have achieved remarkable growth rates and acquired considerable market shares, and for good reasons. The digital user experience and vision they create are truly revolutionary for the financial industry. There are no cumbersome processes and outdated banking apps. Instead, users can register and access banking services with only a few clicks in an environment that simply 'makes sense' and is fun to use.

This revolution in banking might not have the same impact on wealth managers as it has had on commercial banks, as personal interaction, trust and brand take precedence in wealth management. However, the need for a superior user experience is a strong indicator for the future and a trend that the wealth management industry is heading towards. Younger generations are unlikely to settle for anything less than a state-of-the-art integrated digital channel experience in any interaction with their bank.

While wealth managers still have the upper hand in this battle for now, they need to assess the digital challenge seriously and plan their next move if they want to remain part of the financial services of the future.

WEALTH MANAGEMENT IS TURNING DIGITAL

The traditional wealth management model is changing. Following the trends of today's digital world, ultra-high-net-worth individuals' (HNWIs) use of technology is rapidly increasing along with their expectations from each interaction they have with their bank.

These trends show little signs of slowing down. Indeed:

- Nearly half of investors (49 percent) use mobile apps to manage their investments, and this is only going to increase; yet wealth managers are by and large behind on mobile offering[1].

- Nearly half of investors (48 percent) are using the digital proposition as one of the key determining factors in selecting a wealth manager[1].

- Only 27 percent of wealth managers currently have and are happy with their mobile platform, even though they believe this is the digital capability that clients value most[2].

- 68 percent of wealth managers say learning about and keeping up with new technology is the top challenge they face[2].

The message is clear - there's a new digital reality for wealth management and today's wealth managers need to act now – or they could lose a sizeable proportion of their customer base.

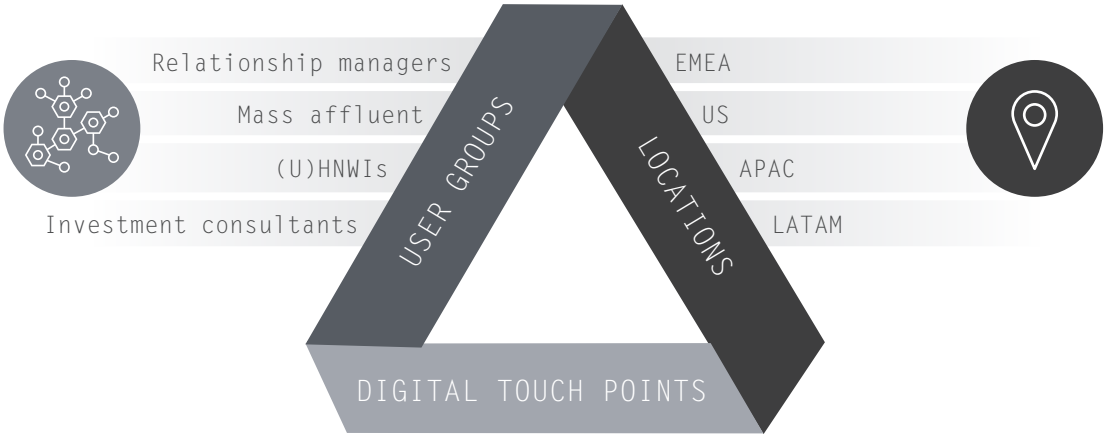
CHALLENGES FOR WEALTH MANAGERS IN THE DIGITAL SPACE

A digital channel generally describes a single digital touchpoint provided by an organization for its users, such as a website, a mobile app, a corporate online platform, internet banking or even social media channels. An integrated digital experience is highly valued by banking customers, with non-traditional providers enjoying increasing customer loyalty.

In global banking and wealth management, digital integration is a considerable challenge as more parameters come into play, as shown below.

The digital touchpoints in the wealth management arena can be split between locations (e.g. EMEA, U.S. or APAC) and serve different user groups such as clients (UHNWI, HNWI) or internal users (relationship managers and investment consultants). Such complexity demands a unified digital strategy if a wealth management provider wishes to succeed in the digital world.

THREE DIMENSIONS OF DIGITAL INTERACTION



- Mobile app
- Internet banking
- Website
- Corporate online platform
- Social media

CHALLENGES FOR WEALTH MANAGERS IN THE DIGITAL SPACE CONTINUED

For a successful digital strategy, we believe wealth managers need to address the following challenges:

- **The rise of the hybrid digital advisor model.** Traditionally, personal interaction has been one of the core values of wealth management and clients still expect it. It is unlikely any client will ever become 100 percent digital, however, robust and secure channels are still required for their interactions with the bank. Wealth managers need to strike the right balance between human and digital in the hybrid advisor model. The initial steps of the engagement and several advisory sessions can take place online, but the final decision will still most likely be made in person.

- **Cost of investment in cross-border solutions and legacy platforms.** The existence of dispersed digital channels across several locations due to varying compliance requirements or legacy systems is an additional challenge for global wealth managers. Managing several digital footprints globally can significantly increase maintenance and overheads in an organization.

- **Individual needs and expectations of each user persona (whether client or internal user).** UHNWIs have different expectations and digital channel usage profiles to those of HNWIs, family offices or relationship managers. For instance, UHNWIs expect a different and much broader coverage in terms of asset classes compared to mass affluent. Also, an investment advisor would expect a digital channel view to be 'harmonized' with the view of the client to facilitate the advisory process. Failing to properly consider and address these critical parameters might lead to gaps in functionality, compliance issues, damage to the provider's reputation and, eventually, reduced user base.

- **Gaining competitive advantage through digital capabilities.** Competition within the global market is inevitably raising standards across the board. A bank needs to not only match the digital capabilities of its peers but also keep up with the digital experiences provided by the tech giants that are now part of the daily life. Additionally, challenger banks and fintechs have set a new bar for user experience, where a user can complete their onboarding and access a complete set of functionalities entirely from their mobile device. However, wealth management clients above all seek trust and a proven track record from their bank, which is a major advantage of traditional wealth managers over challenger banks.

- **Meeting wealth management clients' needs in the digital era.** Wealth management clients are highly demanding in terms of the digital banking offerings they expect from their bank, such as robo-advisory, peer-to-peer (P2P) investment and lending opportunities or access to alternative asset classes. To address this, wealth managers need to enter into strategic partnerships with fintech innovators in each field, to leverage their technology and expertise.

KEY INGREDIENTS OF A SUCCESSFUL WEALTH MANAGEMENT DIGITAL CHANNEL

Addressing the challenges of a rapidly-changing global market calls for a bold digital channel strategy, with clear and measurable goals. It is necessary to evaluate the maturity of a solution and systematically define a target state and the steps to achieve it. Here's how:

Deliver a seamless omnichannel user experience with a focus on client-advisor collaboration:

- Revolutionize the way advisors work with clients with a common platform serving internal and external users.
- Foster collaboration by providing a matching interface and harmonizing tools between advisors and clients.

Find the right balance of digital and personal interaction in the hybrid advisor model:

- Continuously deliver value to the client through digital capabilities and applications.
- At the same time, focus on providing a complete and high-end client-servicing toolkit for relationship managers and advisors, aimed at increasing efficiency (thereby saving clients' time) and providing support for client relationship development.

Design with extendability and reusability in mind:

- Enable servicing new user segments and supporting operations in new locations swiftly and cost-efficiently.
- Enable rollout and support of common features and digital capabilities on different channels and with new user segments.

Focus on smart client self-servicing capabilities:

- Focus on the dual aspect of self-servicing, i.e. relieving the advisor from administrative tasks (such as client data management) while providing a fast and secure way for clients to manage their data directly from their internet banking or mobile device.

Provide a framework to support digital collaboration with external providers to enable Open Banking and API integration:

- Several regulatory initiatives (i.e. PSD2) combined with the rise of fintechs have necessitated Open Banking APIs. This has led to a new era of digital banking where the provision and consumption of external APIs is an absolute must.
- Through Open Banking, wealth managers add value to corporate clients or family offices by, for instance, providing an API to integrate their platforms where they can interact in a structured and controlled manner with the bank.

In today's wealth management and global banking, digital capabilities (and client expectations) are rising at breathtaking speed. Wealth managers that cling to traditional client experience and are weighed down by legacy architecture find themselves at a disadvantage, as new, non-traditional providers enter the market. At this point, the most important decision for wealth managers is how to respond.

A more robust, forward-thinking alternative is to build an architecture that allows for integration of third-party solutions to enhance wealth management offerings. These solutions continue to emerge and improve as the industry evolves.

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INVESTING IN WOMEN IN WEALTH MANAGEMENT: TACKLING BARRIERS AND BIAS IN LEADERSHIP POSITIONS

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SUMMARY

Today, women across all industries are underrepresented and underpaid compared to men. It is a huge concern that women are still far from being afforded equal opportunities to take on leadership positions within financial services, and specifically within wealth management. Diversity in the workplace, in any form, has the ability to enable an optimal team culture while also increasing a business' reputation. Senior leaders by definition are always looking to enhance their firm's core competencies, particularly when it comes to how prospective employees perceive the culture. The key to long term success is simple: invest in your people and the workplace culture. The first step towards achieving this is acknowledging the extent of the problem and taking the appropriate measures to remediate it.

According to the National Center for Education Statistics, women make up more than 56 percent of college students nationwide. However, statistics also indicate that a woman with a bachelor's degree earns roughly the same as a man with an associate's degree. The gap is evident, and some of the largest wealth managers are already making a conscious effort to narrow this gap. The priority has now shifted to investing in the right talent, putting aside any bias, conditions or gender preferences. These firms have devoted a lot of time and capital towards initiatives that bring more women into the workplace, resulting in an environment that is more attractive for the next generation of leaders.

To succeed in this competitive, disruptive environment, firms must fully embrace the move towards equality. The firms that lag behind will need to be more proactive in their efforts to empower future leaders of wealth management.

WOMEN ARE 56 PERCENT OF COLLEGE STUDENTS. HOWEVER, WOMEN WITH A BACHELOR'S DEGREE EARN THE SAME AS MEN WITH AN ASSOCIATE'S DEGREE[1]

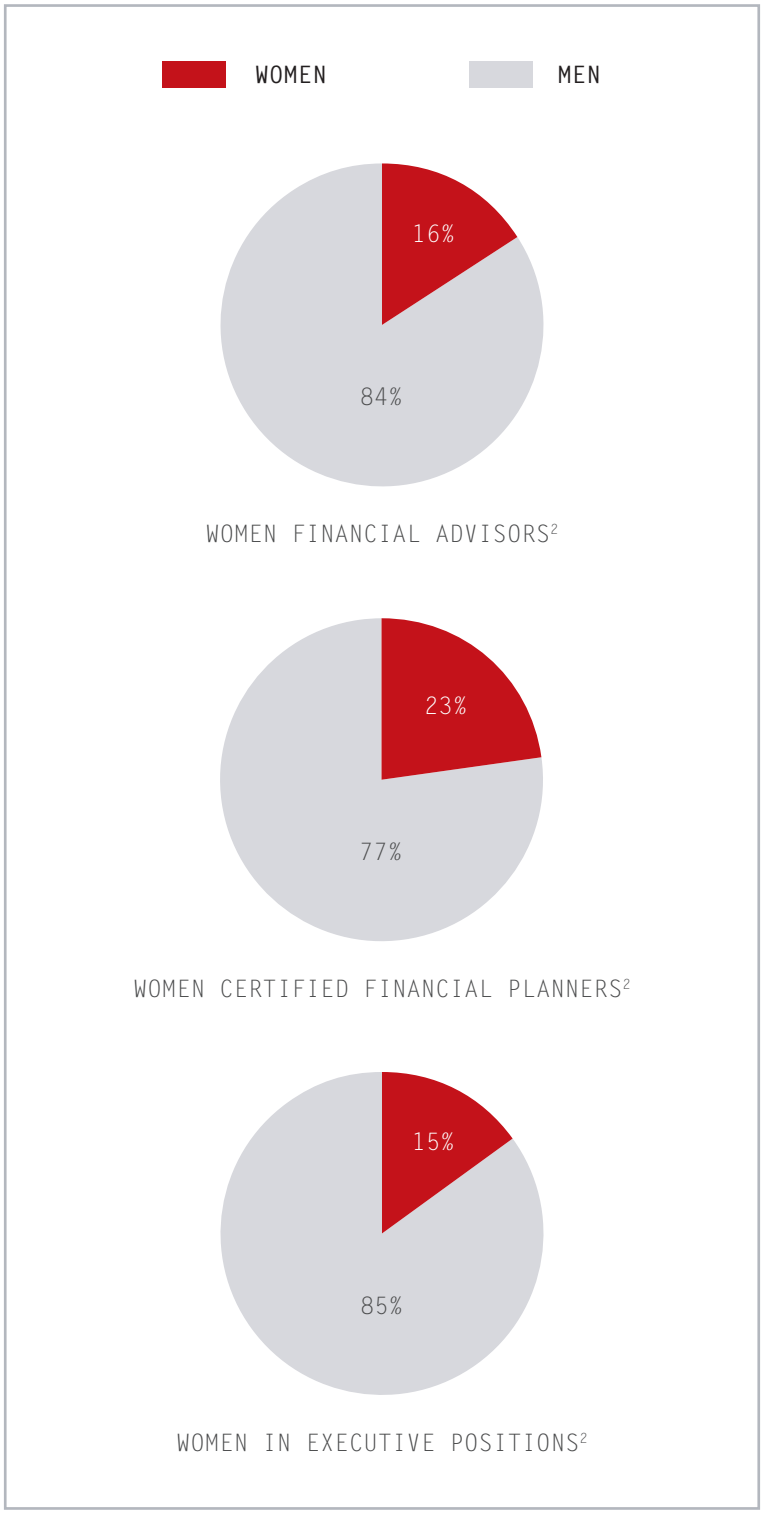
INTRODUCTION

Research and multiple statistics suggest that women in financial services are underutilized and undercompensated compared to their male counterparts. The wealth management industry is no exception. It has been more than 100 years since the first International Women's Day and over the years, it has become clear that equal representation from both genders is one of the keys to success. Despite this, only 16 percent of financial advisors and 23 percent of certified financial planners in banks are women[2]. This number gets progressively lower as we move up the corporate ladder, with women only occupying 15 percent of the executive level positions in the wealth industry.

In addition to unequal opportunity, there is also the issue of unequal pay. Women, again, in almost all industries, are subject to both the uncontrolled and controlled gender pay gaps. The uncontrolled gender pay gap in 2019 still shows women earning a median salary of only 79 cents for every dollar earned by a man. Since the Equal Pay Act came into effect in 1963, this figure has narrowed by less than half a cent per year[3].The controlled pay gap, which adjusts for factors such as title, years of experience and location, on the other hand, shows progress, with women now earning 98 cents for every dollar a man receives. While this progress is of course positive, it is important to note that this pay gap has only shrunk by $0.008 since 2015[3].

A significant reason for the underrepresentation of women in the wealth industry is the 'motherhood penalty,' and the typical stereotypes around women having a larger emotional bias towards family commitments, putting the job and the firm's future at risk. Aside from the presumptuous nature of this claim, society is now more progressive. Traditional roles allocated to men and women are becoming blurred and parental responsibilities are shared equally between partners. Adopting this outdated view, especially in leadership positions, is now recognized as a symptom of a wider problem. It shows the firm's orthodox mindset and bias in talent management, making the firm highly unappealing to the next generation of leaders.

> *"The biggest asset that any firm has is its people, and companies need to have the foresight to make gender diversity a strategic priority and invest in initiatives that will position them to win in the war for talent."*


WOMEN
MEN
16%
84%
WOMEN FINANCIAL ADVISORS[2]
23%
77%
WOMEN CERTIFIED FINANCIAL PLANNERS[2]
15%
85%
WOMEN IN EXECUTIVE POSITIONS[2]

IMPORTANCE OF DIVERSITY

Firm culture, which includes diversity initiatives, is considered a core competency alongside more common attributes, such as seamless customer service and industry-leading expertise. Corporate culture is one of the few unique measures that define the foundational values of a firm. Building an inclusive, diverse culture sets a firm apart and attracts prospective employees.

The term 'diversity' is incredibly broad. There is no set formula for becoming diverse. Not only does it refer to intrinsic characteristics like gender or ethnicity, but is also a cerebration of uniqueness. It is about empowering people by respecting and appreciating what makes them different. In this current era of business that is dynamic and disruptive, innovation is the key to success. And the only way to drive innovation is to harness the power of unique ideas from diverse groups of people[4].

> *"Employees need to know that the path to the top is fair, and not a derivation of one's gender or other bias. The firms that make an active choice and invest in the advancement of these initiatives are setting the tone for success in the industry."*

Firms that prioritize diversity of thought will naturally create a deeper talent pool within their organization. But, for firms to achieve a real state of diversity, they must commit to both diversity of thought and equal representation. The current lack of gender diversity in leadership positions is counterproductive to this vision. Firms cannot claim to be investing in their culture without proving it at all levels of the organization, especially at the top. The call for equal representation in no way implies that men in leadership positions are undeserving. Instead, it means that there are likely women who are equally worthy and qualified for those positions, but certain factors including the notion about their commitment to the job may be dictating an unfair judgment of sustainability in those roles. A lack of women in C-suite positions not only undermines a firm's inclusive culture but also damages the perception for those starting their careers.

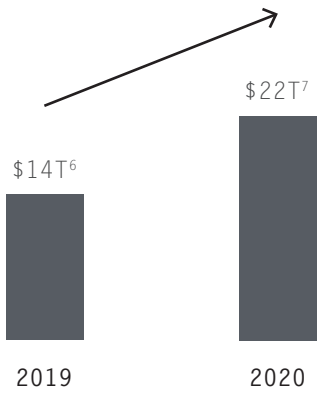
It is a common sentiment that younger millennials entering the industry are typically known to 'job-hop' within the two-year mark; however, it is interesting to note that this trend has been attributed mainly to the longing for an inclusive, open, and diverse culture[5].

Young women beginning their careers within the wealth sector must feel welcome, but above all, appreciated and supported for their achievements. They need to see other women in senior leadership roles to identify a career path ahead of them. It has taken 226 years to name a woman as the President of the NYSE. This followed shortly after a woman was made the CEO of NASDAQ in 2017. While these are positive signs of change, there is still plenty of room for growth. These developments should not be considered exceptions, but rather the norm.

WHY IS DIVERSITY PARTICULARLY IMPORTANT FOR WEALTH MANAGERS?

The reason why wealth managers should ensure diversity at their workplace is simple – it makes good business sense. If firms want to be better positioned to compete in the future, they need to be willing to evolve with the ever-changing industry.

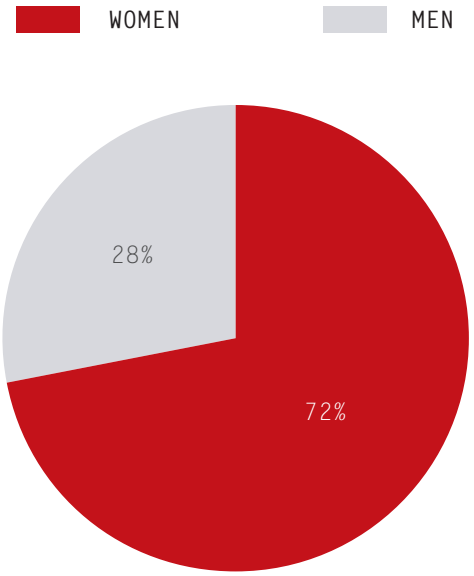
As customer demographics are shifting, women's earning power is increasing, and the imbalances in wealth ownership are slowly beginning to correct themselves. In America, research has shown that women control more than half of the household finances. American women currently oversee about $14 trillion in assets[6] and are projected to control upwards of $22 trillion by the year 2020[7].



ASSETS OVERSEEN BY WOMEN IN THE U.S.

Moreover, nearly 72 percent of high-net-worth (HNW) millennial women are the primary decision makers when it comes to financial planning[8].

Regardless of gender, the industry is seeing customers demanding more personalized and tailored solutions. To remain competitive and meet customer needs, firms must alter their business models and create teams of people with different skills and expertise. Wealth managers need to be creative and strategic, focusing on what will work tomorrow versus what has worked in the past. This can only be achieved through creating a diverse workforce who can share their individual ideas, knowledge and perspectives.



HIGH-NET-WORTH MILLENNIAL WOMEN ARE THE PRIMARY DECISION MAKERS WHEN IT COMES TO FINANCIAL PLANNING

WEALTH MANAGEMENT COMPANIES THAT EMPOWER WOMEN

Today, there are only a handful of wealth managers who seek to empower women and place an enhanced focus on the development of their careers. Institutions such as UBS, Morgan Stanley, and Silicon Valley Bank have successfully implemented programs and initiatives to support the movement towards promoting women in wealth.

UBS

UBS is one of the key influencers committed to gender equality in its wealth management business. According to UBS Group CEO Sergio P. Ermotti[9], UBS embraces diversity from the top of the organization. As a proud signatory of the U.K. government's Women in Finance charter, the core of UBS's strategic plan is to "hire more, promote more and lose less" women, focusing mainly on senior level roles.

For one, UBS has shortlisted and deliberately interviewed qualified women for most of its open senior positions. As a result, over the last three years, the number of women hired in its UK business has increased by 37 percent[9]. Additionally, UBS is devoted to providing existing female employees with multiple opportunities for career advancement. In 2017, the bank became a global member of the 100 Women in Finance group. Through engagement, philanthropic, and educational initiatives, the 15,000 members of the organization regularly connect to strengthen gender equality within the field.

Furthermore, to 'lose less' female employees, UBS has made its global women's networks open to all employees. In fact, one of its largest network-sponsored events—UBS' International Women's Day celebration—is well-attended every year by both men and women. The bank firmly believes that women in wealth are becoming a force for economic change and has been taking the necessary steps to support such women in their endeavors.

MORGAN STANLEY

Another wealth manager that prides itself on its gender diversity initiatives is Morgan Stanley. In September 2017, the firm gathered 300 top female financial advisors for its third biennial Women's Leadership Summit. The purpose of this event was to kick off a multi-year campaign to propel more women to its top tiers of management. Only a few have landed thus far, but according to James Gorman, Morgan Stanley's CEO, the firm is looking to change that. Currently, women account for just 19 percent of Morgan Stanley's managing directors. Higher up, there are only three women on the 17-member operating

committee, the firm's most senior governing body[10]. The ability to have a long-awaited discussion with senior men and women in the room has brought the bank one step closer to resolving the lack of gender diversity in the industry, and also sets an example for other firms on Wall Street to follow suit.

SILICON VALLEY BANK

Silicon Valley Bank (SVB) has become a wealth leader in the dialogues on topics surrounding gender equality. In 2014, SVB launched a firm-wide Diversity and Inclusion (D&I) survey to understand its employees' experiences, interests and priorities[11]. The results from this survey identified areas of opportunity to raise awareness and shape the bank's D&I strategy moving forward.

A year later, as part of this strategy, SVB launched 'Unconscious Bias' workshops. In these workshops, employees learned how they could interrupt bias in their decision-making processes. Building upon that foundational program, in 2016, SVB started to roll out additional workshops with its leaders across the globe[11]. The goal for these workshops, which still take place today, is to provide managers with practical tips to mitigate unintentional bias within the language they use to talk about talent and leadership at SVB.

As a founding partner of theBoardlist, SVB has helped business leaders identify and recommend highly qualified women to join boards of innovative companies. In sum, its considerations for its female employees in wealth, and its focus on developing and supporting these women, have deemed Silicon Valley Bank a change advocate in the industry.

Though all these institutions have taken different approaches to address the gender gap, the underlying theme is abundantly clear. Firms that challenge the status quo, and are proactive in transforming their workforce, are best placed to succeed in the industry and attract and retain new talent.

PATH TO SUCCESS FOR WEALTH MANAGERS

Firms need to position gender-parity as a strategic priority and ensure that their policies and culture align. People are central to the success of any firm, so it is critical that employers focus on attracting and retaining talent. To evolve as a firm, and as an industry, we must embrace diversity.

Organizations who succeed will hire talent with no pre-bias and welcome different backgrounds and opinions. The focus should not be on giving priority or preference to gender-specific employees, but rather on providing an equitable and meritocratic environment for success.

Once an organization achieves equality within the work environment, it will also address the concern about aligning with the evolving customer demographics. To quote an executive of a large wealth management corporation: "The wealth industry needs to reach a state where the only thing you need to shatter a glass ceiling is talent, drive and a passion for what you do."

Roles should not be allocated based on gender, but on the person who attains the relevant skills, experience and passion for getting the job done.

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CUSTOMER-CENTRICITY IN THE AGE OF HONG KONG VIRTUAL BANKING

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INTRODUCTION

Asia is fast-emerging as a hotbed of digital banking, especially in Hong Kong. Indeed, the country's banking regulator, the Hong Kong Monetary Authority (HKMA) was one of the first movers in the region to grant virtual banking (VB) licenses, with eight entities emerging as the winning licensees in the first quarter of 2019[1]. The tides are turning as other countries in Asia are following suit; with Singapore recently announcing it would grant five new licenses to virtual banks in the coming year[2].

To succeed in the already crowded Hong Kong banking landscape, which has 160 banking licenses[3], it will take more than digital transformation and slick customer journey designs; it is a race for retail and small medium enterprise (SME) customer acquisition and loyalty. These companies must aim at the heart of what customers expect from their banks today, and beyond. Leveraging expectations forged by the big techs from both the West's 'FANGs' (Facebook, Amazon, Netflix, and Google), and the East's 'BATs' (Baidu, Alibaba, and Tencent), customers have come to expect services that are easy to use and intuitive, yet underpinned by complex functions and interwoven platforms.

The typical neo and challenger banks in the United States and the United Kingdom have clean and attractive interfaces, no minimum balances, free foreign exchange services, and personal finance tools or dashboards. These have proved popular with younger customer bases but converting this popularity into profit comes down to nailing down a differentiated product suite. According to a survey by Finder.com, a comparison-shopping website, 15 percent of 18-23 year-olds and 9 percent of adults in the U.K. now have a neo bank account[4]. But this adds onto the challenge for the incoming virtual banks to convince their new users to take the leap and use them as their primary bank versus for occasional use or low margin transactions.

Adopting a human-centered approach to solving customers' needs begins with empathy. This requires a deep immersion into customer decision making process to really understand the motivation behind the user's specific choices and actions. It also requires more than a 'lift and shift' of what has worked in the West, but by taking stock of the emerging consumer trends, utilizing a data-driven and customer-centric approach specific to the Hong Kong and Asia market.

As the eight new virtual banking players battle it out for supremacy in Hong Kong, we unpack seven key digital trends in Asia that these new retail-focused entrants should consider as they build their products and services. We additionally outline design principles to help ensure that online services do not lose the human touch.

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE

1. THE RISE OF THE SUPER APP

The Chinese tech giant, Tencent, pioneered building the super app concept through WeChat, which has allowed its massive base of one billion active users per month (as of 2019[5]) access to different services, such as travel and restaurant bookings, online shopping, gaming integration and financial services (payments and foreign exchange are amongst its current suite of services). WeChat was one of the first globally that ushered in the 'app within the app' concept, catapulting it to the most used application in China[6] and the third most used messaging app in the world[7]. It has proven immensely popular with its active users who use the app not only for connecting with their network but also for other everyday transactions and services.

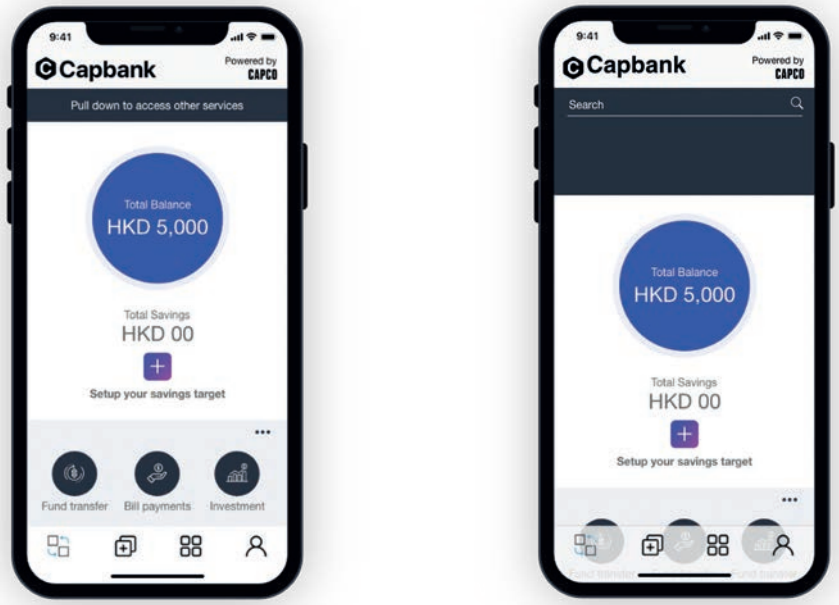
Indeed, Hong Kong consumers look for all kinds of applications that can help them with life's tasks. Borrowing from WeChat's innovation, new virtual banks can look at designing apps that not only assist users with making common transactions such as payments and transfers, but ones which also link to other favourite applications, such as cab hailing and restaurant reservations.

In the context of a new digital-only bank, today's customers look for the best one that can help them achieve their goals. The classic segmentation approach of tweaking product features and services for specific segments is no longer sustainable as the customer views the market differently. He or she simply has a task and looks for the best product or service provider to do this for him or her. The 'jobs-to-be-done' framework is applied by leading companies today, the whole premise being that customers 'hire' companies to make progress on specific circumstances for them.

In the case of a retail virtual banking customer, they will look to do most financial transactions such as check the account balance, pay bills, pay peers, do mobile transfers, and so forth with a click of an app. These services have already been rolled out by the traditional banks, but what has not yet been fully explored are 'mash-ups' with other apps. Following WeChat's lead, virtual banks can look to integrate with other applications and partners to offer a virtual concierge experience.

Design principle: understand the customer through their jobs-to-be-done (JTBD) to shed light to on new market insights for the virtual banks and pave the way for differentiation, innovation, and growth.

THE SUPER APP



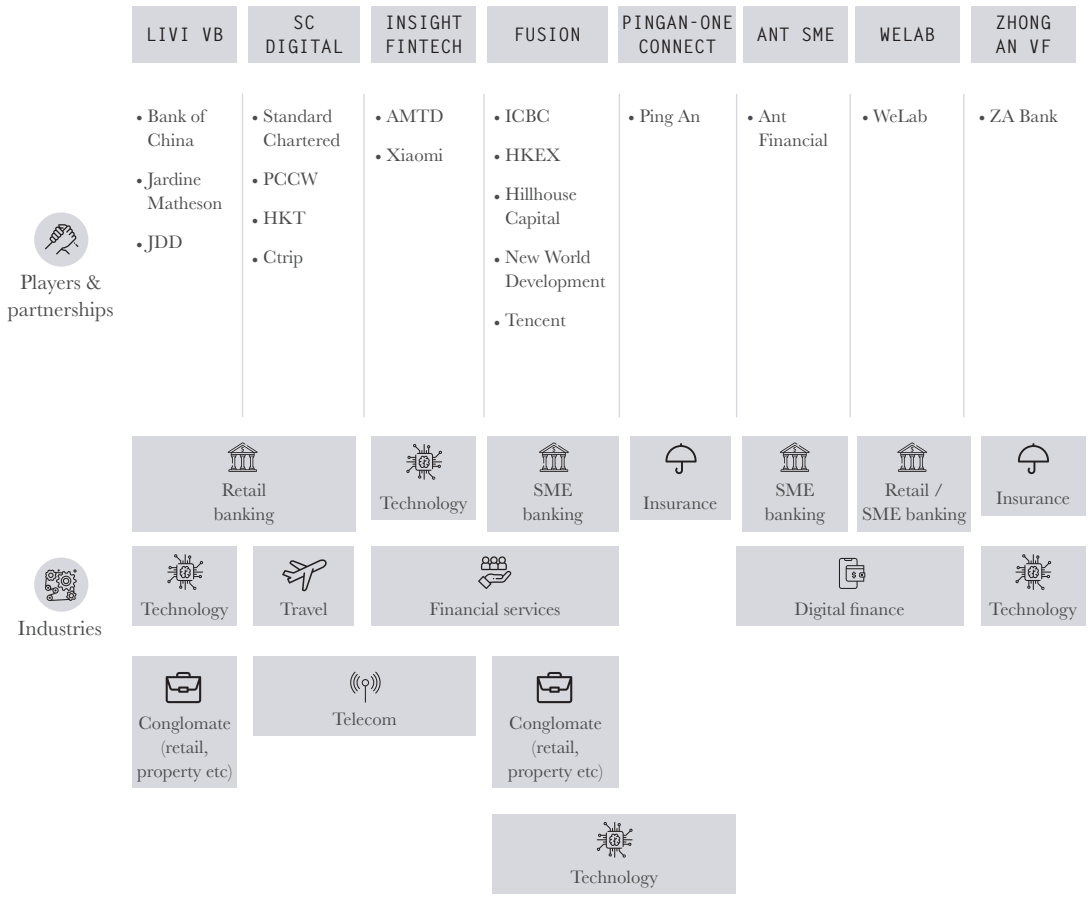
> *"Forget about your competitors, focus on your customers."*
>
> – Jack Ma

Source: Capco Digital user experience research and design

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

Most of Hong Kong's virtual banks poised to launch in the next few months are composed of partnerships from an eclectic mix of industries (see below):

AN OVERVIEW OF THE FIRST 8 VIRTUAL BANKS & THEIR PARTNERSHIPS



Source: Capco Digital analysis

Two new retail-focused virtual banking players, Livi Virtual Bank and Standard Chartered Digital, each have formed strategic alliances to deliver a full suite of services for retail customers.

Livi VB8, is backed by three giants from disparate industries: banking via the Bank of China, technology and e-commerce giant through JDD.com, and a Hong Kong diversified conglomerate, Jardine, which has sprawling interests in retail, property and financial services. Livi indicated that their virtual bank would complement lifestyle offerings like clothing, food, accommodation, and other forms of shopping and leisure so it is likely that Livi will build their own ecosystem. Similarly, SC Digital[8] also forged partnerships spanning diverse industries such as banking, telecom (PCCW), and travel (C-trip, China's largest online travel site), therefore it seems that these two banks will take similar approaches.

After Hong Kong's 'Smart City' blueprint was implemented in 2017[9], several innovations have been made in the travel sector to pave the way for digital enablement. This creates a hassle-free travel experience from mobile or online booking, check-in, and all the way through to navigation during trips and managing rewards points. But according to the 2018 Google study Smarter Digital City 2.0[9], only 22 percent of Hong Kong residents think that the tourism industry has been successful in creating a seamless digital experience. This signifies an opportunity for the new wave of retail-focused virtual banks to create better customer experiences for Hong Kong outbound travellers within the ecosystems these banks are currently building.

Alipay and WeChat Pay have well over a billion regular users of mobile payments[10] and conduct two-thirds of all global mobile payment transactions[10]. Although primarily a trend originating from China, the inbound flow of mainland Chinese travellers into Hong Kong will inevitably shape the future of payments in the city as well in the next year or so. As in the case of Finland, where thousands of Finnish retailers and merchants now accept QR-code based mobile payments, given the forecasted five million Chinese travellers expected to visit the country by the end of 2019[10]. This bolsters our viewpoint that the upcoming virtual banks would benefit from adopting the super app concept as well forge partnerships with the big techs and sharing economy players.

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

2. TIE-UPS WITH SHARING ECONOMIES

Sharing economy players, such as Uber, have a substantial user base with 300,000 active users per month in Hong Kong as of 2017[11] and are pervasive in the everyday lives of their customers. Other sharing economy players such as China's peer-to-peer lending platform Lufax and HSBC Hong Kong's successful PayMe application have amassed critical users in recent years.

In Southeast Asia, Grab Holdings widened its reach through partnering with China's leading healthcare and insurance provider, Ping An Healthcare, to jointly deliver transformative services in Southeast Asia through digital channels. The joint venture plans to work with governments, hospitals, and doctors to provide efficient and timely healthcare to the Southeast Asia's population, most notably those that do not have access to medical care.[12]

Following this example, Hong Kong's new wave of retail-focused virtual banks will benefit from forging partnerships with sharing economy providers by using their platforms as a complementary channel to provide their financial services. For example, Citibank partnered with Airbnb Asia[13] and first launched in Singapore, offering its Citi cardholders discounted bookings. Partnerships contribute to the goal of catering to the customer's holistic lifestyle needs.

Hong Kong consumers will need help to consolidate these virtual finances as more digital economies are created, such as in-app top-ups, peer-to-peer payment platforms and loyalty program currencies – for aggregator apps that are currently only limited to banking transactions, they will need to expand their scope to include these virtual money and accounts as well.

> *"People are deleting apps from their smartphones because there are too many of them. To stay on the screen, you must be extremely relevant."*
>
> – Anthony Tan, Grab CEO

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

3. HYPER-CUSTOMIZATION

According to the Google study on Smart City, 86 percent of the Hong Kong's consumers conduct online researches, while 90 percent of offline purchasers research banking products online beforehand. This means that customizing pre-sale engagement via omnichannel experiences will provide financial services companies the opportunity to gain a higher share of wallet if they successfully push relevant and attractive offerings through digital channels.

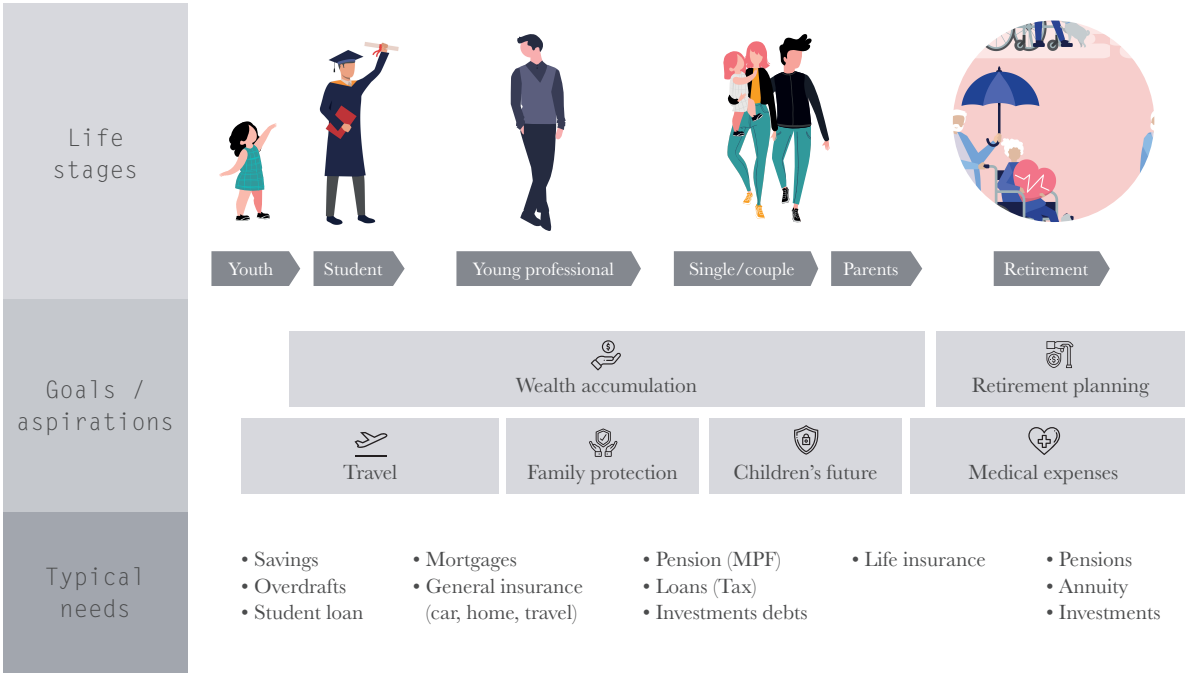
The concept of customer segmentation based on a static set of factors such as age and income level is slowly fading. With the amount of data available, the new banks can design web or application pages that respond dynamically to customer inputs and offer targeted products addressing specific life stages of prospective or existing customers.

Zhong An insurance in China has a one-minute quiz in its app to categorize prospective customers based on life stages. This is followed with a personalized interface that displays insurance products around important life events and provides tailored insurance policies for the individual.

In the same vein, banks have been customizing product offerings based on customer life stages, goals, and asset sizes; however, dynamic customization of product offers within the app is not yet prevalent and could be a key differentiator for the new virtual banks.

LIFE STAGES, GOALS, AND PRODUCTS MAP

Assets



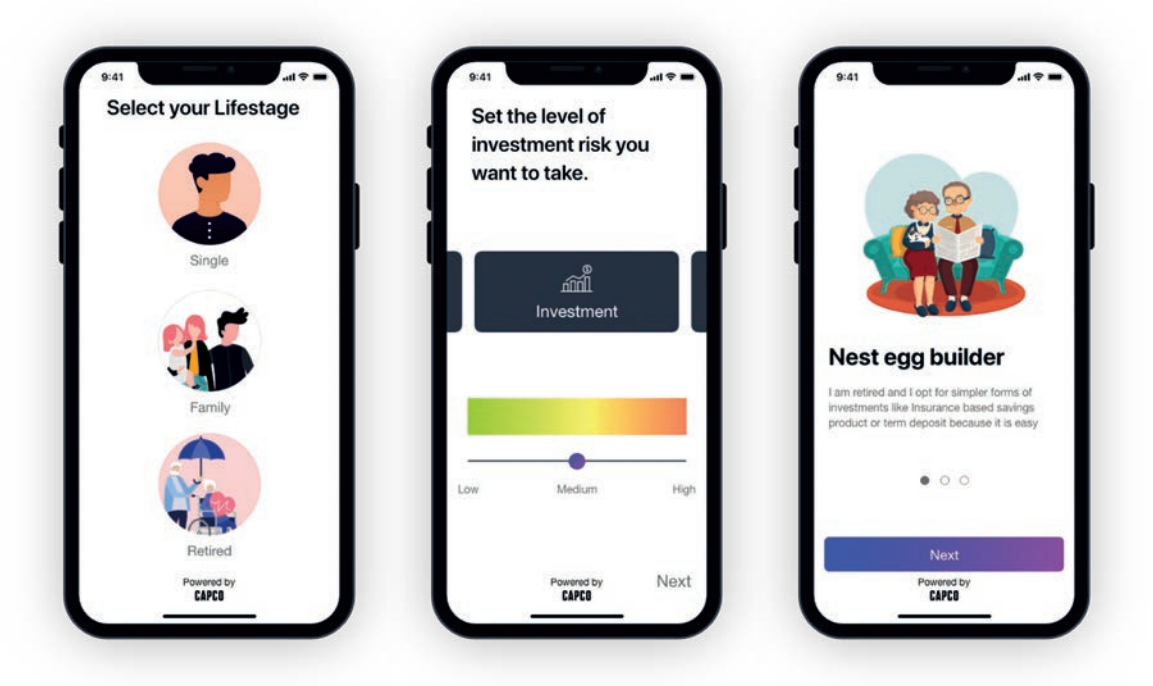
Source: Capco Digital analysis

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

In the context of a new digital-only bank, today's customers look for the best bank that can help them achieve their life goals. Dynamic customization of offers can certainly help with the offer-to-purchase conversion rate as certain products are offered based on a specific customer persona at the point of purchase.

The challenge that Hong Kong's new batch of virtual banks face is to appeal to both the functional and emotional needs of the Hong Kong consumer. The customer drive to provide for their families and plan for retirement[15] are examples of JTBD that these virtual banks can fulfill. This also offers opportunities for

HYPER CUSTOMIZATION INTERFACE - EXAMPLE 1



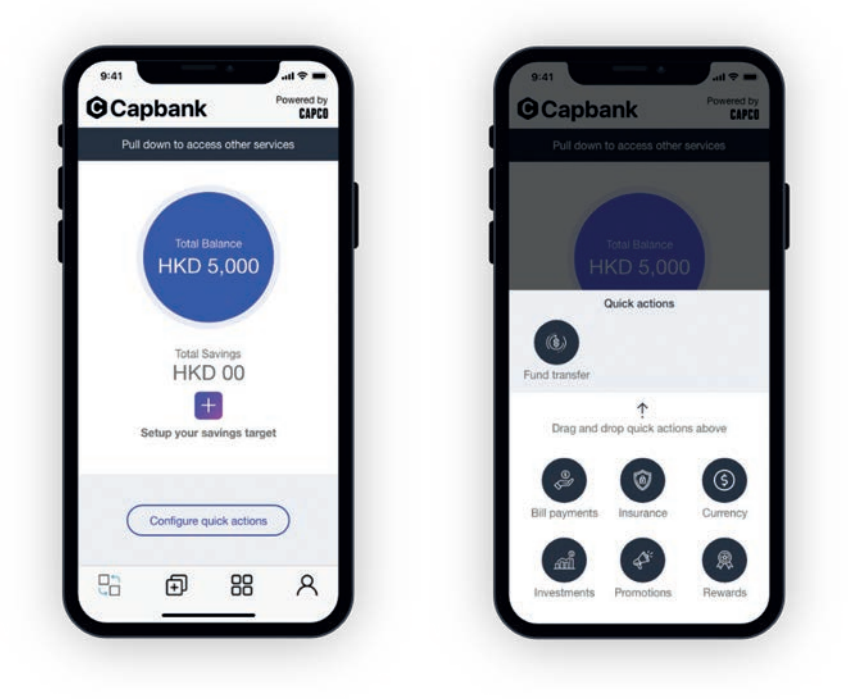
Source: Capco Digital user experience research and design

virtual banks to provide O2O (online to offline) personal pre- and post-sales services to achieve sustained customer loyalty.

Design principle: offer the customer the power to customize the financial services that are most relevant to his or her goals and lifestyle.

Another level of customization touches not only on the products, but the interface display itself. Imagine if you can build your own bank (BYOB), where not only the bank pushes the appropriate products to a specific customer, but also offers the customer the power to customize their own app pages by re-ordering features to what is the most relevant to their goals and lifestyle.

HYPER CUSTOMIZATION INTERFACE - EXAMPLE 2



Source: Capco Digital user experience research and design

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

4. ENGAGEMENT THROUGH SOCIAL CONNECTIVITY

A distinct characteristic of Hong Kong – like its Asian neighbours - is a strong family or social orientation, spanning generation lines. Asian consumers tend to pursue group-based[16] or family-oriented goals versus the analytical and individualistic drivers of their western counterparts.

Whether it be caring for elderly parents during retirement or providing financial support for children while at university, family and community connectivity is paramount on the list of Asian and Hong Kong customer priorities. Understanding the psyche of the Hong Kong and Asian customers is crucial to developing offerings that hit the mark in this already competitive financial services landscape.

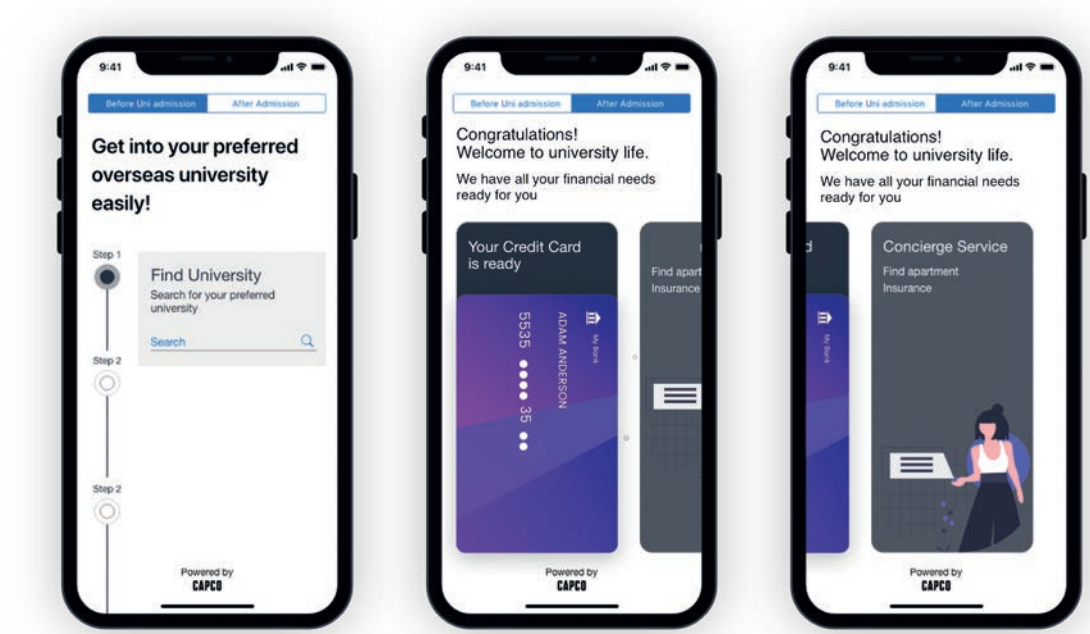
In terms of banking products, traditional banks have already created propositions such as savings financial education and advice targeted to the next generation. Designing with the view to capture the hearts and minds of Hong Kong consumers means that virtual banks can benefit from designing their visuals and copy in such a way that clearly articulates contributing to achieving family, community, or collective goals.

Research has shown that planning for their children's future and building or preserving family legacy is top of mind for Generation Xers and Baby Boomers in Asia[17,18]. Particularly in Hong Kong, this translates into parents who place a lot of emphasis in getting their children into the 'right' schools.

Virtual banks can respond to this need by partnering with account holders – both from the parents' and children's perspectives – in their journey from finding the appropriate schools, applying to their schools of choice, and helping the students navigate their new environments once they are accepted. The virtual bank plays the role of an education and financial advisor across this whole journey.

Depending on the virtual bank's customer target segment, it can connect to the Hong Kong audience by showing images of social connectivity and provide solutions that answer the needs of groups versus individuals. Additionally, borrowing the 'like' or review features from social networking and travel recommendation sites such as Facebook and Trip Advisor, where people within a network can recommend products and services to their peers or family, may increase stickiness and interactions with their virtual banks. This underscores the concept of group connectivity. This can forge or strengthen emotional connection between customers and the virtual bank brand.

SOCIAL CONNECTIVITY AND FAMILY GOALS ORIENTATION



Source: Capco Digital user experience research and design

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

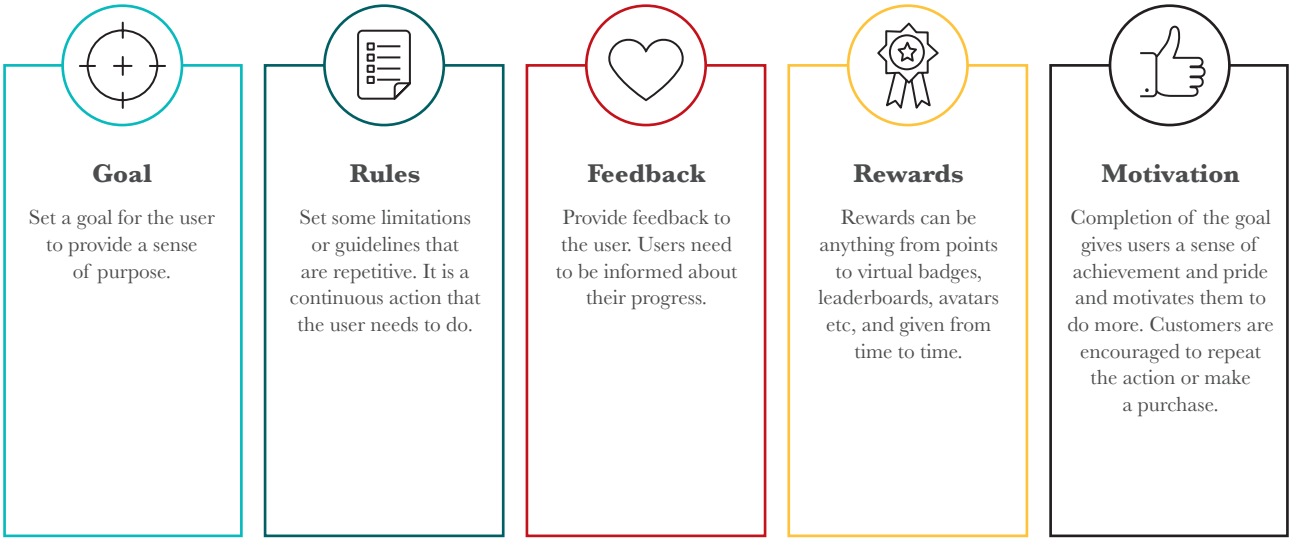
5. DELIGHT & GAMIFY

Rewards based on usage is not a novel concept – in fact it has been around for decades. However, research has shown that the effectiveness of a rewards program may get lost in complexity. Focus groups that get the pulse check of Hong Kong consumer point towards the fact that local customers value simplicity in redemption. We have seen banks try to 'spice up' their rewards program by adding new rules and complicated conditions, but instead of generating excitement it just frustrates cardholders, making it difficult for them to engage with the program. This complexity dilutes the 'delight factor' and has even sometimes brought about frustration on some brands. Rewards should therefore be clearly understood and easily redeemed.

Tying in with the concept of social connectivity, virtual banks can be creative in their approach to deliver rewards programs by providing immersive experiences. Hong Kong's digitally savvy millennials may respond favourably to gamification coupled with obtaining real rewards for positive behaviour. In our experience, there are several principles adopted from the gaming world, that have led to swift and sustained adoption (see chart on the next page).

> *"The challenge that Hong Kong's new batch of virtual banks faces is to appeal to both the functional and emotional needs of the Hong Kong consumer. The customer drive to provide for their families and plan for retirement[15] are examples of jobs-to-be-done that these virtual banks can fulfill."*

GAMIFICATION PRINCIPLES



EXAMPLE CASE

Customer sets a goal to save for a new car.	Bank sets a rule to save a minimum amount of HKD 6,000 every six months.	Bank pushes trigger notifications for each milestone achieved (or not). For example: HKD 1000 – Level 1 HKD 2000 – Level 2 HKD 4000 – Level 3	Bank gives a reward for points or a benefit. For example: "Get a preferred financing rate of 2.49% APR for achieving your goal!"	Customer commits to the goal, appreciates clear guidelines and transparency on progress, and achieves satisfaction in attaining the reward.

Source: Capco Digital analysis

SEVEN CUSTOMER TRENDS IN HONG KONG & ASIA'S DIGITAL BANKING SPACE CONTINUED

For example, virtual banks can leverage alliances with retailers within their partnership ecosystem and provide rewards such as exclusive access to sales or give ability to jump queues for on-demand retailers and get hard-to-get concert ticket for clients who reach the top of the leader board for savings targets. These are concrete and straightforward rewards that are easily redeemed and immediately tangible (see interface example on the next page).

Executing seamlessly on functional job aspects will address the practical and objective customer side of the requirements. And taking stock of the unique Hong Kong customer trends we outlined, such as social connectivity, virtual concierge via a super app, and so forth, means virtual banks can potentially achieve the scale and loyalty they seek as customers connect on the emotional level with the bank.

6. NOT JUST BELLS AND WHISTLES

Simple human-centered design that incorporates the Hong Kong customer behaviour and expectations will attract new customers. However, gaining a substantial share of wallet and customer loyalty will largely depend on the products and services these banks offer. In addition to building scale, banks should also deal with the fact that once critical mass is reached, profitability then takes center stage.

Hong Kong's virtual banks should take a page from the playbook of the challenger banks or neo-banks in the United States and the United Kingdom as these players have had a few years' head start. The first-mover digital banks offer better user experience and interfaces compared to traditional banks, however there is a view is that their offerings are not differentiated enough.

As soon as the eight new players in Hong Kong launch their offerings, amassing scale will be the name of the game for these virtual banks over the first year or so. However, with scale comes increased cost pressures. A case in point is United Kingdom's neo bank Monzo, which increased its cost base by 54 percent in February 2019 after it increased its personnel expenses threefold[19].

This surge in expenses puts pressure on the neo banks' ability to roll out unique products and services.

Once scale is achieved and the pendulum swings to commercial viability, Hong Kong's retail-focused virtual banks can again take a page out of the playbooks of their western counterparts. To date, the pairing of the modern appeal of a digital bank with good old-fashioned banking services such as credit cards, personal loans, and mortgages is still proving to be the winning formula for these neo and challenger banks in the United Kingdom and United States to successfully convert their popularity to profitability. In 2018, Goldman Sachs launched Marcus, an online lending product, with a savings account plan offering a generous interest rate of 2.05 percent, offering access to credit to individuals (considering various life stages) and small to medium enterprises.

Amidst all the bells and whistles these new virtual banks will usher into Hong Kong, the path to profitability for them may still be capturing the spread between deposits taken and loans offered to customers – the tried and tested products and services which traditional banks before them have made their profit on over the centuries.

> *"You've got to start with the customer experience and work back towards the technology – not the other way around."*
>
> – Steve Jobs

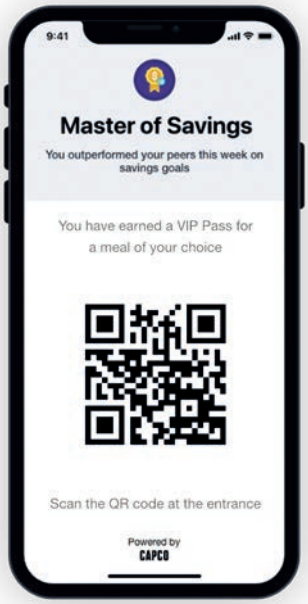
Design principle: Lean user experience (UX) which is concerned with the experience design and less focused on deliverables than traditional UX. Applying this principle, requires a greater level of collaboration with the entire team. The core objective is to focus on obtaining feedback as early as possible so that it can be used to make quick decisions. The nature of agile development is to work in rapid, iterative cycles and Lean UX mimics these cycles to ensure that data generated can be used in each iteration. This principle is a leading example of developing and testing new interfaces, quickly applying key customer trends.

7. ARTICULATE A CLEAR MISSION

As virtual banks throw their hats into the already crowded banking ring, it becomes a strategic imperative to carve out a distinct purpose. What does this mean? Virtual banks must be laser-focused on their propositions for their specific target audience.

Having a clear mission to specific sets of the population is crucial. Has the virtual bank set its sights to be the financial partner to the millennials, embedded in their everyday lives, such as SC Digital? Or does it offer banking solutions as a service to other banks, such as One Ping An? Or is the virtual bank aiming to focus on the SME customers and the unbanked? Having the cutting-edge technology as the virtual bank's backbone is not enough – their products and services must be tied to a clear identity.

GAMIFICATION INTERFACE



Source: Capco Digital user experience research and design

TYING IT ALL TOGETHER

Amid the initial rush to acquire customers, virtual banks must focus on building long-term relationships with their clients and deliver excellent experiences to achieve brand advocacy, customer loyalty, and profitability. The eight newly-minted virtual banks should take stock of these Hong Kong customer trends and expectations, solve their specific needs and JTBD, and offer solutions that approach them in new and truly transformative ways.

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DATA MANAGEMENT: A FOUNDATION FOR EFFECTIVE DATA SCIENCE

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October 2019

SUMMARY

Data sourcing and cleansing is often cited by data scientists to be amongst the most critical, yet most time-consuming aspects of data science. This article examines how data management capabilities, such as data governance and data quality management, can not only reduce the burden of data sourcing and preparation, but also improve quality and trust in the insights delivered by data science. Establishing strong data management capabilities ensures that less time is spent wrangling data to enter into an analytics model and more time is left for actual modeling and identification of actionable business insights. We find that organizations that build analytics data pipelines upon strong data management foundations can extract fuller business value from data science. This provides not only competitive advantage through the insights identified, but also comparative advantage through a virtuous circle of data culture improvements.

> *"Combined with data from existing 'analogue' operations, as well as access to a sea of current and historic market data, banks are increasingly looking for ways to make all their data work more than it was originally intended."*

INTRODUCTION

In the past decade, competitive threats from new market entrants, heralded by the digital revolution, are placing ever-increasing pressures on margins within the banking industry. New arrivals from the digitally-savvy fintech sector are free from legacy thinking and infrastructure, and traditionally non-banking organizations are increasingly looking to cross-sell financial services to their large existing customer bases. Both types of entrants possess substantial comparative advantages over traditional banks, which is causing a significant disruption of the banking landscape.

Whether it is seeking to gain an advantage or simply to protect market share and keep up with the competition, this has resulted in a rapid advancement of digital agendas at more traditional banks. Increasing digitization, of course, means increasing dependence on and generation of more data. Combined with data from existing 'analogue' operations, as well as access to a sea of current and historic market data, banks are increasingly looking for ways to make all their data work more than it was originally intended.

It is against this backdrop, in the hunt for net margins and differentiation of products/services, that data science is fast becoming a key capability for old and new players alike in the industry. Customers are increasingly expecting a level of servicing (in relation to, for example, accessibility, availability, privacy, security, and personalization), that can only be effectively delivered through fundamental uplifts in the way data is handled and leveraged within the organization.

However, as this article sets out, maximizing the returns on investment (RoI) in data science requires (1) a scalable means of harnessing the hidden connections, correlations, and relationships in the vast quantities of data available, and (2) a business culture that readily accepts and allows data science to influence its business strategy. It is our belief that a strong and mature data management capability is crucial in achieving both objectives.

WHAT IS DATA SCIENCE?

Simply put, data science is the collection of analytic methods and tools by which business insights can be extracted from statistical and semantic relationships in data. Data allows an organization to both develop a deeper understanding of what has happened, and also make stronger predictions as to what might happen. Drawing upon a variety of disciplines covering applied mathematics, information technology, computational theory, and data visualization techniques, these methods and tools encompass the most basic of spreadsheet-based data analyses to complex machine learning (ML) and inferential artificial intelligence applications.

Financial services organizations (FSOs) leverage data science in a variety of ways to discover new opportunities and make data-driven decisions around risk management and operational efficiency. Use-cases range from developing better customer relationships, and understanding of preferences, to predicting employee behavior and detecting financial crime – data science can be applied in any function that generates or has access to data. The overall idea is that these insights can then be turned into actionable business strategies that would otherwise not be visible to an organization.

For all the zeitgeist, however, data science, as the name would suggest, is still a data-driven discipline at heart. Regardless of method or complexity, a common process exists for all data analytics processes: the data must first be sourced and prepared for inputting into the analytics, and the analytics output must then be evaluated by the data scientist who then communicates any insights to decision makers.

The implication is that the intended insights and business value of the analytics can only ever be as good and reliable as the data that underpins it. Or in other words, "garbage in, garbage out", and when it comes to data science, there is more than just a nugget of truth in this well-worn cliché.

DATA ANALYTICS PROCESSES

LIES, DAMNED LIES, AND STATISTICS

As a capability, data science is only effective if it ultimately provides positive value – the analytics results must serve a business purpose. Increasing the effectiveness of a data science capability means producing insights that can be trusted so that decision makers can turn these into strategies, which when executed produce business outcomes that are in line with the expectations set. This in turn drives a virtuous circle where data science is increasingly placed at the heart of an organization's strategic decision making.

'Garbage out' – incorrect, misleading, meaningless, or otherwise unusable data science output – causes non-optimal strategies and misguided business decisions at best, and financial and reputational damage at worst. This not only reduces the business value of the immediate results, but also erodes the trust that decision makers will have in future results, breaking the circle.

Here the issue of trust is key. Regardless of how powerful, accurate, or statistically reliable the results are, the data science capability itself needs to be trusted for decision makers to turn the analytics results into business strategies. Establishing, retaining, and growing this trust, requires business outcomes that are consistently in line with the expectations set by the communicated results.

In the evaluation of data science insights, qualifying the results with a degree of *confidence* sets expectations as to how reliable the conclusions are. Confidence is provided quantitatively by an array of statistical measures, such as confidence intervals, p-values, and r-squared values. It is also provided qualitatively by descriptive interpretation of the statistical results, caveating the assessment with any risks to the reliability of results due to the assumptions made, model specification, sampling, or data quality issues. Together, these form the basis of trust between the data scientist and the decision maker.

Full and appropriate qualification of results with known reliability issues is simply good scientific methodology. Failure to evaluate results properly is something that should be vigorously guarded against by any number of educational, procedural, or ethical controls within the data science capability itself.

More damaging to trust, however, are the unknown unknowns – when there is an incomplete picture of the reliability and where this fact is not itself known. The causes may stem from issues associated with the scientific methodology, as well as from data scientists having misplaced assumptions in the *semantics*, *provenance*, and *quality* of the underlying data. The results cannot be qualified with something the data scientist is unaware of, and this unknowingly sets false confidence in the results.

This is even more pertinent with data science applications that involve probabilistic outcomes, such as machine learning. In such circumstances, the results are determined from a series of learned outcomes using training datasets. If confidence information is not built into the training process and the learned outcomes adjusted accordingly, the wrong outcomes are learned, and there will likely be significant systemic biases/errors in the final results.

In all cases where the reliability of outcomes is not clearly and accurately determined, significant damage to trust can happen. If analytics results are communicated and acted upon at face value, without knowledge of underlying issues in either the data or the analytics, business outcomes will likely become divergent from the expectations set.

In short, if making no prediction at all is better than providing a false one, then having no data is better than not knowing you have bad data. If data science is to be invested in as a strategic capability, then it is necessary to build trust in data science with decision makers. This not only requires the adoption of sound scientific methodologies, but also a cost-effective mechanism of ensuring data issues are managed, made known, and resolved.

These can be summarized into two key data management requirements for analytics processes: understanding and obtaining the right data, and fixing the data obtained.

UNDERSTANDING AND OBTAINING THE RIGHT DATA

With model-led analytics (e.g., machine learning) the data scientist inputs data into an existing analytical model in order to ascertain its accuracy and viability. In this paradigm, the data scientist must first understand the *semantics* of what data is to be sourced so that the conceptual and contextual specifics of the required data can be specified. The data scientist must then determine where to source the specified data from, which requires an understanding of data *provenance* in order to ensure data is sourced appropriately.

Data semantics and data provenance are also crucial for data-led analytics such as data mining. In this paradigm, the data scientist identifies correlations within a given dataset and derives a theory or hypothesis from the observed results. As such, the semantics

and provenance are not required to source the data, but to understand what and where the data has been sourced from so that the results can be appropriately understood and qualified.

In both paradigms, an understanding of data semantics and data provenance are critical for ensuring that the analytics has the *right* data:

- The data that is needed must be properly and unambiguously defined. To the uninitiated this seems like a trivial task, but the devil is in the detail and getting it wrong risks the analytics being run over the wrong data entirely. This involves identifying and establishing a shared understanding with potential data providers of what is required. If the data scientist wants 'customer name', for example, then an agreement must be made with the provider as to whether 'name of account holder' means the same thing semantically. In this example, there are many hidden nuances: does customer name include prospective or former customers? Does name of account holder cover mortgages, or current accounts, or both? Arriving at a mutual understanding is no simple task without a commonly agreed understanding of the definition, taxonomy, and *ontology* of the data.

- The data that is obtained must be representative of the population. An unrepresentative sample, for example where data obtained only represents specific subsets of the required population biases analytics outputs. As an example, if retail banking customer names are required, then it is important to ensure that the data is sourced from a provider that aggregates customers for all retail banking products, and not just, say, mortgages. Resolving this sourcing challenge requires not only accurate semantic articulation of the data required, but also an understanding of where this data can be reliably obtained.

FIXING THE DATA OBTAINED

Once sourced, data may still contain data quality issues that must be properly understood and resolved prior to analytics. Resolving and correcting data quality issues is a data cleansing process that forms a critical part of the analytics preparation.

Poor quality data inputs can manifest in a variety of ways:

- Data may contain gaps, which if not corrected at source, accurately inputted, or omitted entirely, biases the output.

- Similarly, data may contain duplicates, which if not omitted will also result in biases.

- Data may not conform to an expected format, which if not corrected may at best break the analytics model, or at worst cause the results to become *heteroscedastic* (where the statistical results falsely suggest that the data comes from more than a single population distribution).

- Data may contain errors, which if not corrected will reduce the accuracy of the results.

- Data may be out of date, and the relationships inferred may no longer be applicable.

- Data may not be granular enough or sample size may be insufficient, both of which weaken explanatory power and the significance of outcomes.

To go back to our cliché, the 'garbage in' – incorrectly defined, inaccurate, incomplete, or otherwise poor quality data entered into an analytics process – is a primary limiting factor on the usefulness and reliability of analytics results. If providing quality inputs helps to ensure quality outputs, then having a cost-effective mechanism for understanding and resolving issues in sourced data is critical for improving the effectiveness of a strategic data science capability. This cost-effectiveness is provided by ensuring an effective centralized data management capability is in place.

MANAGING THE INPUTS

If what you get out of an analytics process is only as good as what you put in, then producing good outputs at scale requires cost-effective ways of controlling the inputs. For effective data science, it is just as critical to understand whether or not bad inputs exist, as it is to remediate them.

Good data scientists already know this.

Due to the criticality of ensuring an analytics process is provided with good inputs, data science projects often allocate a seemingly disproportionate amount of time, effort, and resources to simply preparing data for the analytics. The required data needs defining and describing semantically, trusted sources need to be identified, data quality needs to be measured, and issues identified and controlled. As we have already discussed, these are necessary activities to ensure that the end results are reliable and that decision makers continue to trust in the results.

Defining what is needed, identifying where to get it, and data cleansing are, therefore, the data management requirements of analytics processes.

However, these are also hugely time and resource intensive activities. By some estimates, 80 percent of project time is typically spent preparing data for an analytics project.[1] Even for an organization actively seeking to become more data-driven, this is difficult to scale across more than just a handful of projects, and significantly raises the bar for a data science project to be viable through its benefits. In the bigger picture, organizations must find ways to minimize bad data provided to their data science projects, while also minimizing the marginal cost of doing so.

The answer is to ensure an effective data management capability is in place, providing the scale economies necessary for making more data science projects cost-effective.

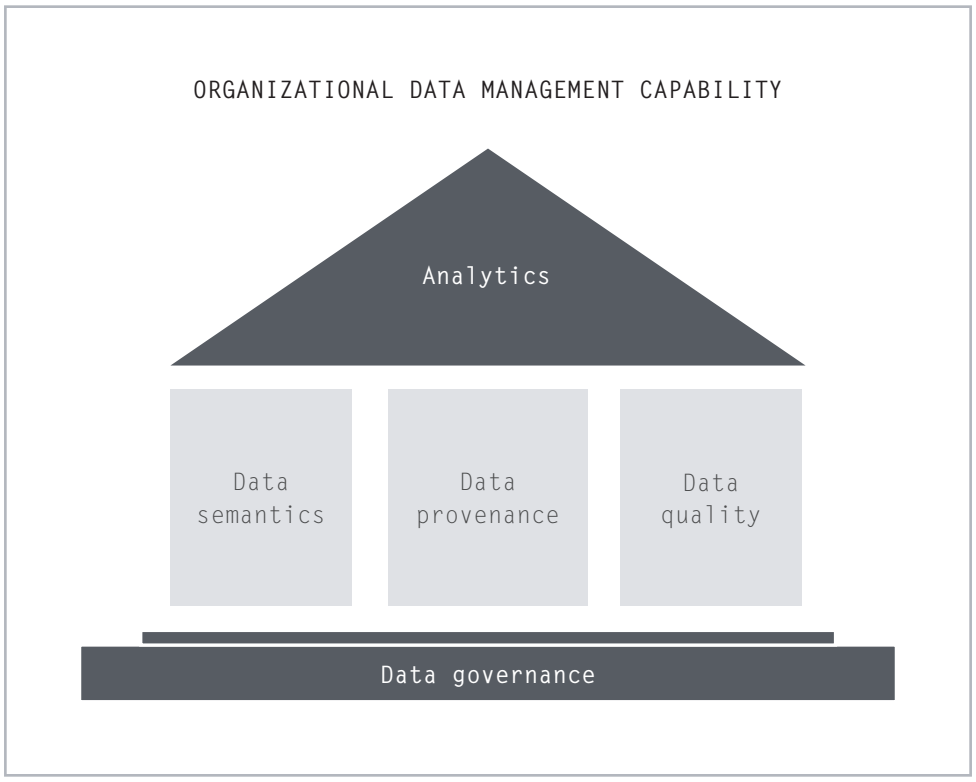
An organization's data management capability provides a set of centralized, scalable services for describing what the data means, for understanding and recording where the data comes from, for maintaining good quality data, and for ensuring the roles and responsibilities for data management are effectively discharged. Briefly, this includes:

- **Semantics**: data is given commonly agreed and understood definitions and placed in a commonly known taxonomy and ontology so it can be categorized accordingly, and semantic relationships between data is clear. Defining the semantics of data can also include conceptual modeling of data in order to understand the hierarchy, ordinality, and cardinality of data relationships with business concepts and data domains.

- **Provenance**: the sources of data, and path taken to where it is consumed, are identified and documented. Depending on the granularity at which this lineage is captured, this can involve identifying the aggregations and transformations en route. Under provenance, sources of data can be certified as 'trusted' if applicable governance (see below) criteria are met.

- **Quality**: various quality dimensions such as completeness, conformity, consistency, validity, accuracy, and timeliness of data are measured and published/reported on a periodic basis. Issues are formally tracked, often against service level agreements defined against the material criticality of the data/process being impacted.

- **Governance**: includes the policies, processes, accountabilities, and responsibilities by which effective data management is defined, monitored, and enforced. Governance acts as a demand-management mechanism for ensuring data management activities are prioritized. Moreover, data governance provides an assurance to data consumers (such as data scientists) that governed data taken from trusted sources is well defined, meets minimum thresholds for data quality, and that data quality issues are formally managed and remediated.


ORGANIZATIONAL DATA MANAGEMENT CAPABILITY
Analytics
Data semantics
Data provenance
Data quality
Data governance

MANAGING THE INPUTS CONTINUED

Without a vision for streamlining the servicing of these requirements, an organization's data science can easily devolve into a web of hit-and-miss fact-finding engagements between analytics projects and potential providers, as each project independently seeks to find the right data from the right sources.

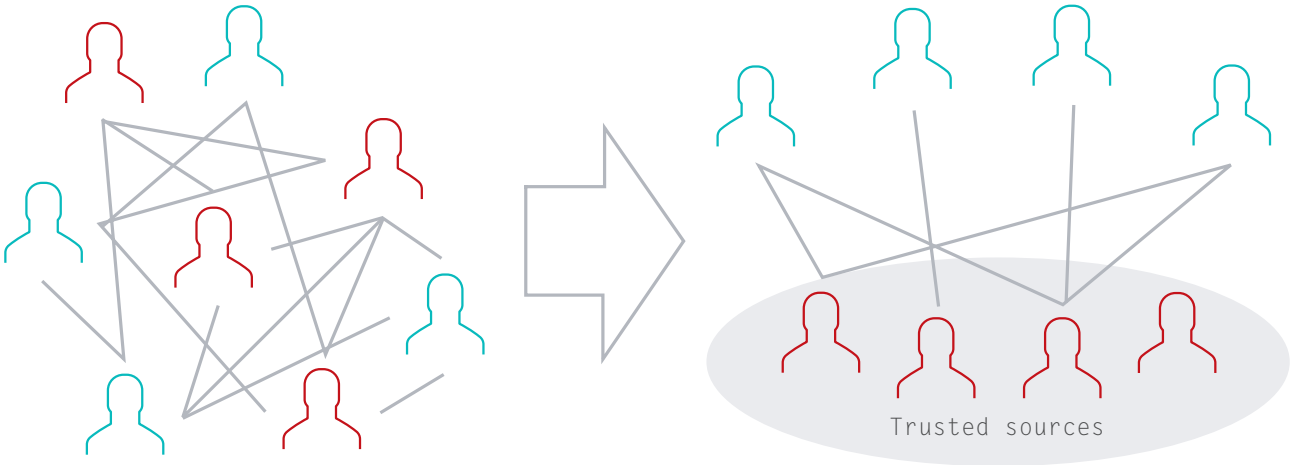
A centralized data management capability provides the hub of data services and expertise that effectively allows all processes, analytics or not, to outsource their data management requirements. In such a setup, the centralized capability actively maintains a library of semantically defined data along with their trusted sources, allowing service users to quickly understand what they need and where to get it, avoiding unnecessary fact finding.

There are several benefits to this. Firstly, the data semantics (definition, taxonomy, ontology, and modeling) and data provenance (lineage and trusted sources) services offered not only free valuable time and effort for data scientists to focus on the actual analytics, but also ensure more reliable and explainable analytics results.

Secondly, it acts as a governing body for all data management in the organization and ensures that the outcomes are available for all processes. This allows for incremental gains as the knowledge (semantics, provenance, and quality) built from one project adds to the existing body of knowledge from others. From the data science perspective, the cost of data management is greatly reduced as data science projects benefit from the efforts of not only other data science projects, but also of the entire gamut of regulatory and transformational programs that occur in a modern FSO. For example, bad quality data is no longer remediated at the point of consumption by each data science project, but at the point of origination, therefore benefitting all consumers (data science and non-data science alike).

Thirdly, a centralized data management capability allows analytics processes and models to be defined in terms of a globally accepted semantic model. This allows for analytics results to be defined and communicated in a common business language, which in turn enables better interpretation and understanding of results amongst decision makers.

MOVING TO CENTRALIZED DATA MANAGEMENT FOR DATA SCIENCE



IMPROVING THE DATA CULTURE

We have already described how trust in analytics outputs is key for driving an effective data science capability, and that significant components of this trust are reliant on the cost-effectiveness of ensuring that analytics processes have 'good' inputs.

However, regardless of how trustworthy analytics results are, decision makers do not habitually act on these insights. This is especially the case with data mining insights that are often produced in financial services with little business sponsorship and poorly defined/planned business implementation.

What is often missing, therefore, is not just trust, but also the willingness of decision makers to take the insights on board and operationalize them. This willingness stems from an inherent mindset or culture for data-driven decision making, where decision makers actively drive the data science process and are invested and interested in the outcomes. In a strong data culture, decision makers place data science output on equal footing to more traditional mechanisms, which are more reliant on experience and intuition.

An effective data management capability helps to foster a strong data culture. As previously described, data governance is a key data management service that ensures the effective discharge of data management roles and responsibilities. Crucially, this involves ensuring data owners and stewards are not only identified but are actively engaged in the governance and management of data. These data owners typically include the same decision makers that analytics projects provide insights to.

In this way, an effective and mature data management capability helps strengthen the data culture of an organization by actively involving decision makers in the governance of the very data that is used to provide insights back to the decision maker. This completes the circle – not only is trust greatly enhanced, becoming an implicit outcome rather than an explicit result of the data science, but it also helps to engender the data culture where decision makers are willingly at the heart of data-driven decision making.

BUILDING A STRONG DATA CULTURE

CONCLUSION

Data science is effective when decision makers regularly make business decisions from the analytics insights, and the business outcomes are consistently in line with the expectations. These goals require trust and willingness on the part of the decision maker to operationalize the business insights provided by the analytics.

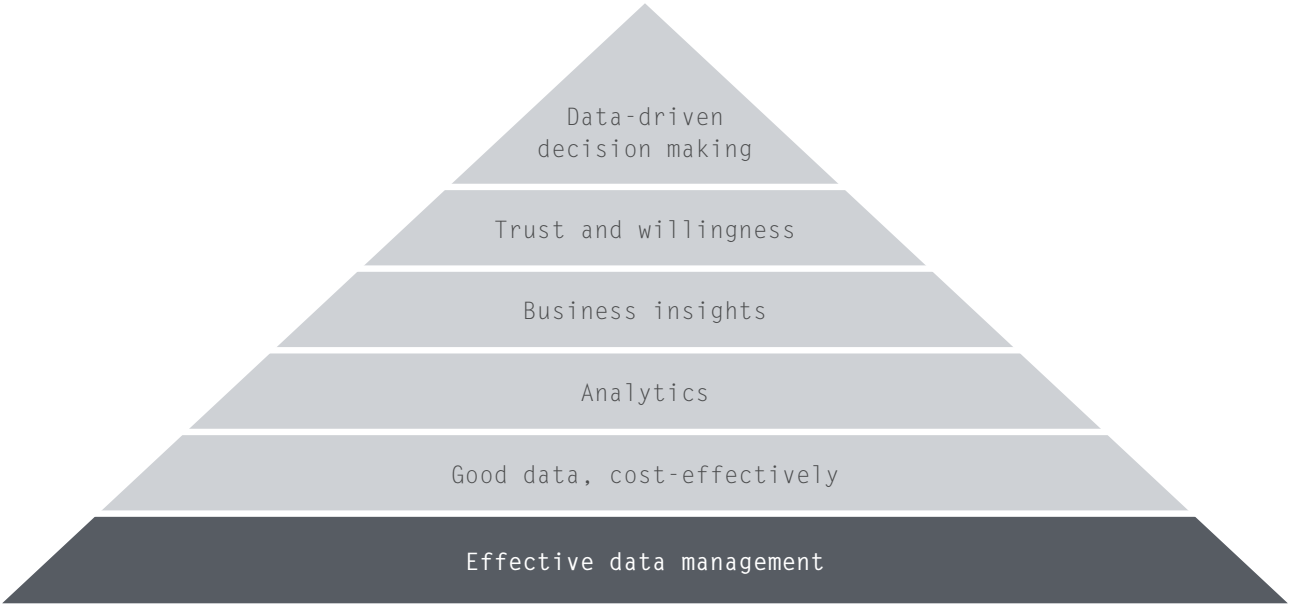
A data management capability helps build the willingness by fostering a data culture that puts decision makers at the forefront of data-driven decision making, and not data scientists. This is done through actively involving data owners in the governance of the data, which is used to provide insights to them.

Trust is built by ensuring business outcomes are consistently in line with expectations. This requires expectations to be properly set, which in turn requires the semantics, provenance, and quality of data inputs to the analytics be defined and known – 'good' inputs. While very time-consuming and resource intensive to perform for each data project in a silo, economies of scale are achievable by outsourcing these data management requirements to a centralized data management function.

In summary, more cost-effective, more reliable, and better understood analytics results build trust in the data science capability. Coupled with improving willingness of decision makers to operationalize analytics insights through mature data governance, implementing a mature data management capability is, therefore, essential in ensuring data science is cost-effective and has scalable impact.

In the hierarchy of needs, therefore, data management is the foundational layer for good data science and data-driven decision making.

HIERARCHY OF NEEDS FOR DATA-DRIVEN DECISION MAKING



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MY FIRST DATE… WITH A BANK
A CASE STUDY ON THE IMPORTANCE OF CX IN ONBOARDING

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October 2019

INTRODUCTION

Today's global financial institutions are facing many challenges, from following ever-growing and ever-complex regulatory requirements, fighting to keep up with the newest technological innovations, to addressing a demanding customer base with higher expectations than ever before. Most institutions are also struggling to overcome issues with their legacy systems, which are decades-old and costly to maintain and upgrade.

While technology is driving the evolution of the financial industry, new tech-savvy competitors with customer-centric digital mindsets are disrupting the operational models of established banks. The race to create new products and design superior user experiences is on and market competition is fierce.

> *"Our users self-selected 14 industry leading banks, but completed only 12 onboarding journeys. This was because two of the banks had such atrocious application processes that even the most motivated users gave up after multiple attempts!"*

WHAT HAVE WE NOTICED?

Often, when we talk to our banking clients, they start by asking the wrong questions; ones that focus on their internal efficiencies rather than the experiences they offer to their end customers. Banks shouldn't forget that their target clients have shifting expectations and that they themselves are also ready to shift to alternative services, providers, banks or even non-banks.

Technological progress and the increasing choice of banking services have led to the evolution of customer needs and desires. Indeed, the customer segment has undergone fundamental changes and will continue evolving as new products enter the market, and as younger demographics of customers, who have grown up 'connected' and digitally literate, look for financial products that reflect their needs and lifestyles.

It is vital that banks remember that customer experience (CX) is the holistic sum of how customers engage with them. CX is purely made up of how customers perceive their interactions with their banks. This perception can of course vary and easily swing from one direction to another. It's not just one journey or one experience, but it can be defined by the following provisos:

- Can I consistently reach you?
- Are our encounters as convenient as possible?
- Are you there when, where, how, I want you to be?
- Is your service valuable to me and does it make me feel valued?
- Do I feel in control and is there an element of personalization?
- Can I trust you?

Given these considerations, we wanted to better understand the role of customer experience across banking journeys, to drive new insights and contribute to a movement to increase customer experience-focus in the financial services industry.

Our findings are presented in the following sections.

ONBOARDING

The atmosphere around onboarding new clients is far more complex today than ever before. Today, banks don't get a second chance to make a first impression!

As we consider this topic and the importance of a solid customer experience from the get-go, we find ourselves thinking of other scenarios where first impressions particularly matter – dating. Especially going on a *first* date.

Who hasn't experienced those bittersweet feelings and emotions that cross your mind before a first date? You're full of hopes and expectations, maybe even butterflies, or perhaps bracing yourself for disappointments and embarrassing moments. The truth is, you will never get a second chance to make a first impression. We find that first-banking feelings mirror first date feelings. Just like with a first date where impressions count, first-banking impressions count for a lot too!

A FIRST DATE WITH A BANK

ONBOARDING IS A BANK'S FIRST OFFICIAL INTERACTION WITH A CUSTOMER AND THE FIRST OPPORTUNITY TO DELIVER A LASTING FIRST IMPRESSION.

DATES	BANKS
HOPES AND EXPECTATIONS	
People have ideas of what they find attractive in a date and hope they'll live up to it – as they've already agreed/ determined they're worth a date	Bank customers have expectations and hopes for specific banking experiences formed off your market presence and general attractiveness
TRUST	
When dating someone new it's important to build trust if it's going to become a lasting relationship	Banks have to convey a sense of assurance and ensure their actions match their words to create a loyal connection with customers
SHARING INTIMATE DETAILS	
Over the course of a date, you might find yourself in a vulnerable position. After all, sharing personal/intimate life details is key to gaining a deeper understanding of each other	The onboarding process is like the first sharing of personal or intimate details for the bank to better understand customers' financial needs and desires
DISAPPOINTMENTS	
Disappointment will set in as expectations are not fulfilled over the course of a date. If you walk away with a negative or unfulfilled feeling you'll choose not to have a second date	If a customer is unfulfilled, they might find it more difficult to walk away from an established banking relationship, leading to resentment and detractors who are likely to hurt your brand given the right platform

OUR STUDY

We identified and invited our colleagues, who were already looking to open a new current account, to participate in our onboarding study. This meant securing a commitment that they would record their onboarding journey from application initiation to card receipt and making their first transaction (which was usually before they had a card in-hand).

We equipped each participant with the same set of six key onboarding milestones to track:

1. Time to submit application

2. Time to verify (KYC)

3. Time to receive IBAN

4. Time to first transaction

5. Time to first online login

6. Time to receive card

We also asked each participant to answer four questions to gauge their customer experience perception after the process was completed:

1. How easy was it for you to open the account?

2. Did you enjoy doing it?

3. Did you feel in control through the process?

4. Would you recommend the bank to a friend?

We recognize that CX journey scoring is subjective and based on the person completing the journey and their answers to the four key questions – just as perception is subjective but vital to CX. We then mapped each person's customer journeys with their recorded experiences (words, actions, thoughts and feelings across the set of milestones). This also included clearly marking our users' incoming expectations and attitude toward banking to inform their subjective journey scoring, highlights, lowlights and their respective personas (i.e. purely anonymized our users, not representative of a full target group).

USER GROUP

Our group of users were a diverse bunch of people. We had new entry-level associates and young professionals in their twenties through to partners (nearing retirement age), digital 'immigrants' to digital natives, different genders, ethnicities, educational and socio-economic backgrounds and conservative versus liberal mindsets.

Some were very financially self-organized personalities and others, self-professed "I don't care, just make it work" types. However, all were people whom banks want as clients. The user group had steady or relatively high incomes and strong credit scores. All in all, professionals who genuinely wanted to open new bank accounts.

It is important to note that as our users were so varied, their expectations of what they wanted and needed from their banks was, too. They each self-selected a different type of bank ranging from retail banks, universal banks, state banks to neobanks, direct banks and fintechs. Most went in with low or medium-low expectations when onboarding with a more traditional bank and with medium-high or high with direct/neobanks. We were therefore especially interested when the newer banking models still managed to exceed or at least well-manage expectations in most cases!

SUBSET OF BANKS

Our users self-selected 14 completely different banks which, luckily for us, were also industry leading, well-known banks with a variety of characteristics and product offerings.

The group completed 12 onboarding journeys in total. This was because two of the 14 banks had such atrocious application processes that even the motivated users actually gave up after multiple attempts! This finding, so early in the study, validated that bank onboarding has much room for improvement and speaks volumes to the current market state of play, and of course, the importance of a strong first impression. In the dating world, those banks would be well and truly dumped!

RESULTS AT A GLANCE

Our insights from the study reveal that the onboarding experience must be optimized across the banking industry as it is unquestionably a fundamental part of the customer experience.

We tracked the journeys across the following six milestones with a focus on four time indicators focused on (1) application submission process, (2) KYC completion, (3) ability to perform first transaction, and (4) time until card received.

Overall, we found lengthy wait-times, a high burden on customer effort, poor digital experience (UX/UI), unfulfilled customer expectations, connection errors and low performance of ID verification providers.

1. APPLICATION SUBMISSION PROCESS

- On average, neobanks tend to outperform traditional banks in terms of time and CX
- Online application submission is faster than mail-in application forms
- Auto-completion of personal data (address, tax-ID) accelerates the process
- Attractive, user-friendly design with creative features (animated icons) results in a higher CX score
- Simple and clear user interface (UI) with reduced text helps to communicate a user-friendly overview and convey a sense of control
- User cancelled onboarding, because application documents needed to be printed, signed and sent back

2. KYC COMPLETION

- The most problematic and time-consuming process
- User is forced to switch devices for various reasons (laptop to mobile and vice versa)
- Connection problems with service providers
- Onfido, Digital Signature, IDNow and WebID outperformed PostID in terms of overall experience and legitimation speed (i.e. Onfido uses document verification and facial biometrics)
- Long waiting periods to reach service employee and customer support
- Chat function helpful to provide instant customer support

3. ABILITY TO PERFORM FIRST TRANSACTION

- The time to perform first transaction varies from minutes to days
- Customers who received access data (IBAN, PIN or online login information) by email or via digital devices were faster to conduct transactions than customers who were forced to wait for post
- Fastest transactions were conducted via mobile banking apps and fingerprint confirmation further supported transaction speed
- Multiple emails and physical letters, mean extra time to sort, organize and store, which increases the burden on the customer – this resulted in a poor CX scores for a number of banks

4. TIME UNTIL CARD RECEIVED

- Generally, customers experience a lengthy wait-time to receive their new bank card
- Features like contactless functionality and ApplePay, GooglePay readiness are necessary to meet customers' changing expectations
- The unboxing experience and card design matter to the customer as design is used to communicate a company's culture in a tangible way
- Insight into shipment tracking is useful to update the customer and schedule their waiting time accordingly

KEY LEARNINGS

CUSTOMER EXPERIENCE

We gauged our individual users' customer experience by asking questions about the account opening ease, the enjoyment factor, the level of control the user felt and whether or not they would recommend the bank to a friend based on their experience. We found the following:

> *"It's been more than 25 years since Bill Gates dismissed retail banks as 'dinosaurs,' but the statement may be as true today as it was then."*
>
> Mills, K., McCarthy, B. (2017). *How Banks Can Compete Against an Army of Fintech Startups*. Boston: Harvard Business Review.

CUSTOMER EXPERIENCE JOURNEY SCORING

THE CX JOURNEY SCORING IS SUBJECTIVE BASED ON THE PERSON COMPLETING THE JOURNEY AND THEIR ANSWERS TO FOUR KEY QUESTIONS:

	SIMPLICITY How easy was it for you to open the account?	ENJOYMENT Did you enjoy opening a bank account?	CONTROL Did you feel in control throughout the process?	RECOMMENDATION Would you recommend the bank to a friend?
FINTECH 1	★★★★★	★★★★★	★★★★★	★★★★★
RETAIL BANK 2	★★★★★	★★★★☆	★★★★★	★★★★★
FINTECH 2	★★★★★	★★★★☆	★★★★★	★★★★☆
UNIVERSAL BANK 3	★★★★☆	★★★★☆	★★★★☆	★★★★☆
RETAIL BANK 1	★★★★☆	★★★★☆	★★★★☆	★★★☆☆
UNIVERSAL BANK 1	★★★☆☆	★★☆☆☆	★★★★☆	★★★☆☆
DIRECT BANK 3	★★★★☆	★★☆☆☆	★★★☆☆	★★★☆☆
DIRECT BANK 2	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆
DIRECT BANK 1	★★★☆☆	★★☆☆☆	★★☆☆☆	★★★★☆
STATE BANK	★★☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
RETAIL BANK 3	★☆☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
UNIVERSAL BANK 2	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆

KEY LEARNINGS CONTINUED

APPLICATION SUBMISSION

Even from our first key milestone – application submission – we garnered a number of revelations. Based on the observation and evaluation of our users' journeys, we found that high performing banks provided the application submission experience to the user across whichever device they choose (mobile, web-based, or in app, desktop, telephone, in-branch).

The more successful customer journeys also had user interfaces with responsive design supporting a visually appealing experience and offered time-saving features in the application like auto-completion of data and digital signature acceptance.

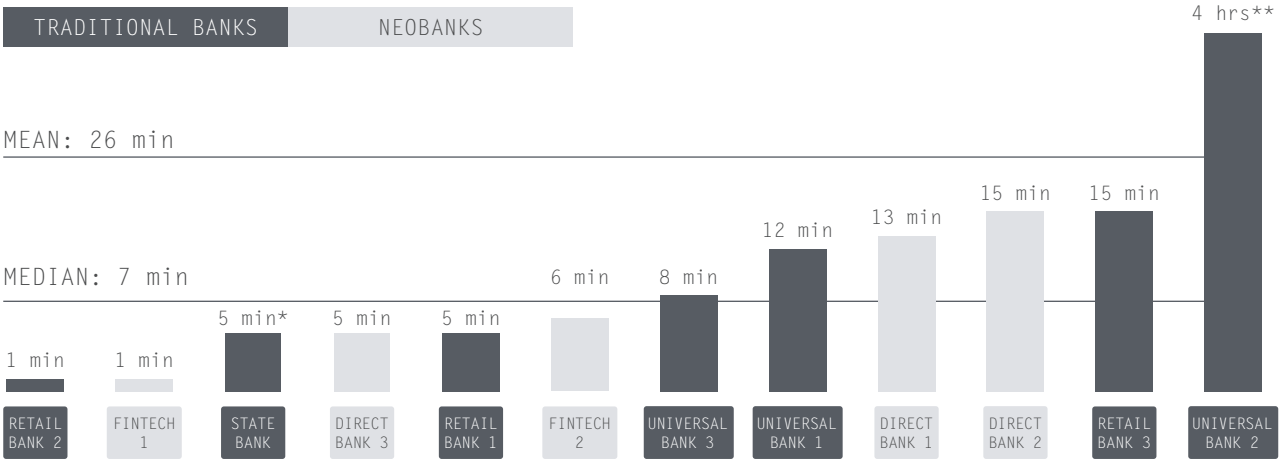
Banks with lower CX scores also required a lot from their customers, relied heavily on traditional mail and overburdened the customer with paper.

We found that on average, neobanks tend to outperform traditional banks in terms of time to submit application. The duration of the registration process takes more than four hours at **Universal Bank 2**, which is a leading German bank. Unsurprisingly, perhaps, neobanks perform most efficiently. They enable the application process in less than ten minutes. But **Retail Bank 2** also operates just as efficiently and enables the application process in less than ten minutes. We have investigated a mean value of 26 minutes (the mean is the usual average, add up all the numbers, then divide by how many numbers there are) and a median value of seven minutes (the median is the middle value of a sorted list of numbers).

The difference in these values highlights how much the bad performance of **Universal Bank 2** deviates from the actual values. The remaining sample banks remained nearly level through the median value of seven minutes.

> *"The application was very quick, easy, natural and convenient. Data is prefilled from digital ID copy. Seamless interface with digital signature. No video chat necessary."*

TIME TO SUBMIT APPLICATION (MINUTES/HOURS)



Data refers to 12 out of 14 banks where our users completed onboarding;
*Duration includes the online submission of application forms, as documents needed to be printed, signed and sent back.
**Duration excludes time to get an appointment at the branch, as foreign citizens are forced to visit the branch.

KEY LEARNINGS CONTINUED

TIME TO VERIFY IDENTITY

For the second key milestone – Time to Verify Identity – we recognized that highly-rated banks provided the KYC process experience to the user across whichever device they chose (WebID, IDNow or VideoID).

The more successful customer journeys consider a simple authentication channel such as Onfido, IDNow, or Digital Signature to accelerate the KYC process. High performing banks also offer time-saving features, such as storing all necessary client documentation in an easily accessible way within the respective client's banking portal.

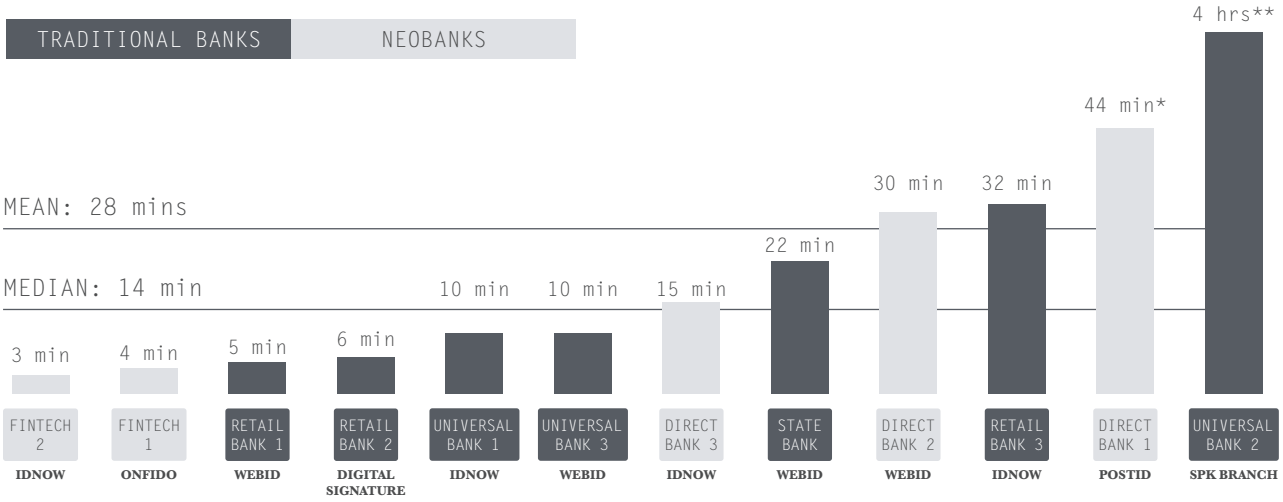
The KYC process is the most problematic and time-consuming part of onboarding. **Universal Bank 2** again scored the worst result in the KYC process. Indeed, **Universal Bank 2** required more than four hours to complete the KYC process because the registration is required on several devices, which is time-consuming and frankly annoying.

Direct Bank 1, a market dominant international bank incidentally, scored the second worst performance, at 44 minutes due to an inefficient verification process.

Meanwhile, the time it took neobanks to verify identity was relatively low (less than ten minutes) and the remaining samples stayed nearly level through the median of 14 minutes.

> *"After I downloaded the APP for verification, I was forced to re-enter my phone number three times… That is annoying!"*

TIME TO VERIFY IDENTITY (KYC) (MINUTES/HOURS)



Data refers to 12 out of 14 banks where our users completed onboarding;
*KYC for was lengthy due to poor quality of service provider (four failed attempts).
**Duration excludes time to get an appointment at the branch, as foreign citizens are forced to visit the branch.

KEY LEARNINGS CONTINUED

ABILITY TO PERFORM FIRST TRANSACTION

Based on what we observed from the ability to perform the first transaction, and our overall evaluation of the journeys, we found that high-performing banks were able to accelerate time to first transaction by sharing online login information instantly to facilitate the online banking sooner.

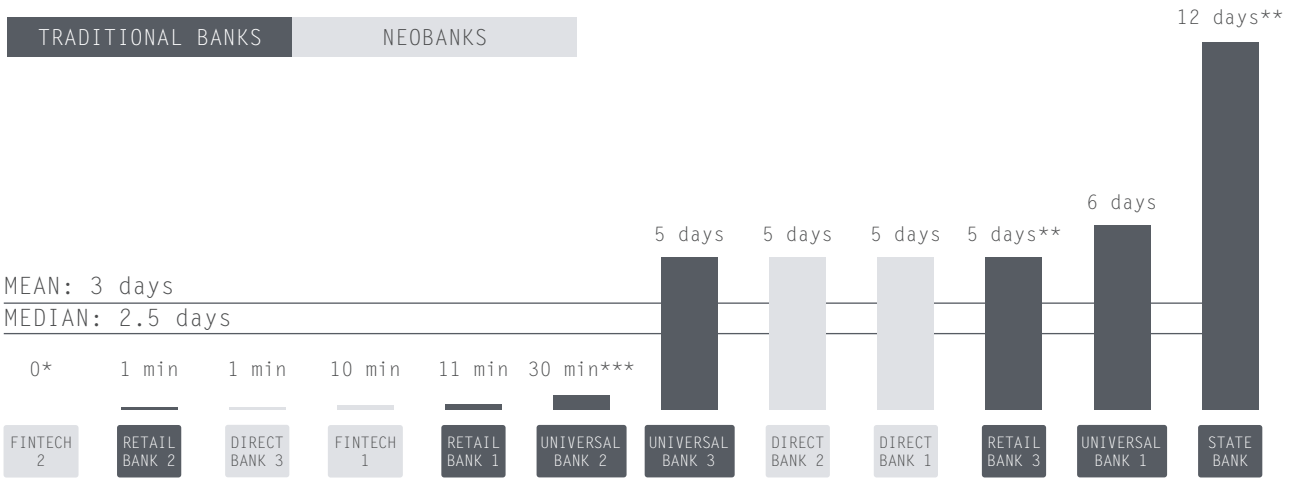
Another decisive clue is that high performing banks provide immediate ability of transactions and seamless process via mobile app. This enables customers to transfer money immediately and comfortably via an application.

The time to perform first transaction varies from minutes to days. The **State Bank** requires 12 days to make the first transaction possible because the access data is only sent by post. **Universal Bank 1** and **Retail Bank 3** which are German leading banks require between five and six days to make the first transaction possible because access data is also only sent by post.

Perhaps unsurprisingly again, those tech-savvy neobanks performed most efficiently. They enabled the first transaction process in less than 30 minutes because all the necessary data needed to perform the first transaction was provided in the app. They were able to perform the first transaction significantly faster than the average (with mean and median values of three days and two and a half days).

> *"The process starts fairly easy and smooth. Legitimation was a mess… But to send money is simple with my fingerprint!"*

TIME TO PERFORM FIRST TRANSACTION (MINUTES/DAYS)



Data refers to 12 out of 14 banks where our users completed onboarding;
*User has not performed a transaction.
**Duration includes the online submission of application forms, as documents needed to be printed, signed and sent back (our user has not performed a transaction here).
***Duration excludes time to get an appointment at the branch, as foreign citizens are forced to visit the branch.

KEY LEARNINGS CONTINUED

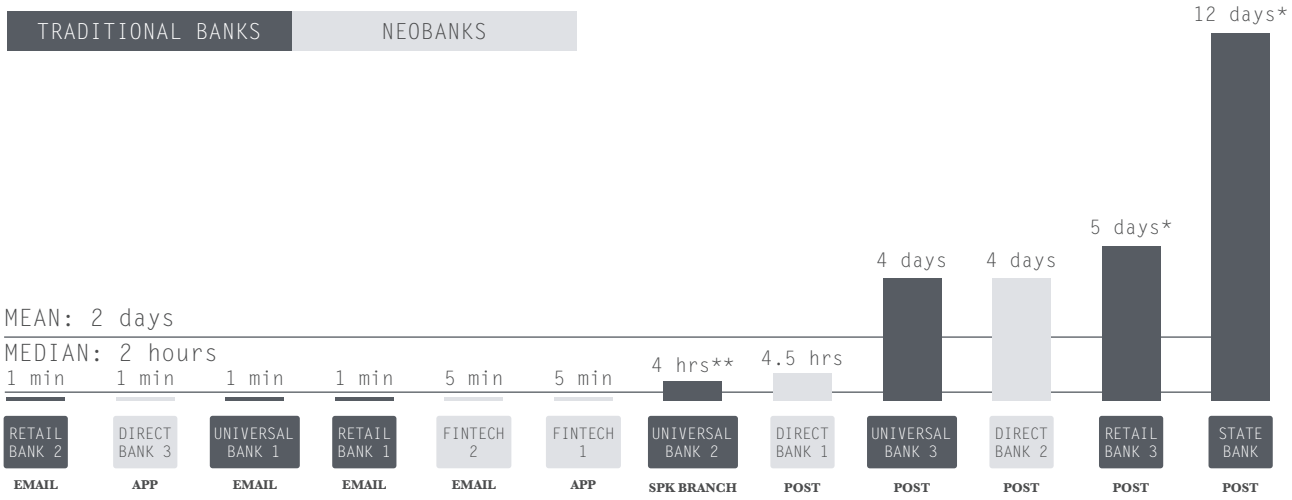
TIME TO RECEIVE IBAN

We found that high performing banks enable a fast delivery of IBAN via email or within the native app. They may also provide the auto-completion of personal data and are able to store all necessary client documentation in an easily accessible way; so not only is the customer happy, the bank is happy too!

As in the prior example, the **State Bank** scored the worst result and required 12 days to provide IBAN because the IBAN is sent by post. **Retail Bank 3** and **Universal Bank 3**, which are leading German banks, and **Direct Bank 2**, which is an international leading bank, varied between four and five days. The remaining sample banks remained nearly level through the median of two hours. The enormous gap between the mean (two days) and median (two hours) illustrates the differences in performance among the banks.

> *"Only three hours after completion of the registration process I received an email with my new account info and IBAN. I actually had assumed, that I would have to wait to receive the rest of the information via post."*

TIME TO RECEIVE IBAN (MINUTES/HOURS/DAYS)



Data refers to 12 out of 14 banks where our users completed onboarding;
*Duration includes the online submission of application forms, as documents needed to be printed, signed and sent back.
**Duration excludes time to get an appointment at the branch, as foreign citizens are forced to visit the branch.

KEY LEARNINGS CONTINUED

CARD RECEIPT

For the last key milestone – Card Receipt – we noticed that high-performing banks ensure a seamless, end-to-end onboarding experience for the user across whichever device they choose (mobile web based or in-app, desktop, telephone, in-branch). Furthermore, high-performing banks also enabled package tracking, which allows the customer to track the shipment of their card and the imminence of its delivery.

The time to receive card varies from three days to 16 days. The **State Bank** once again scored the worst result and required 16 days to provide the bank card.

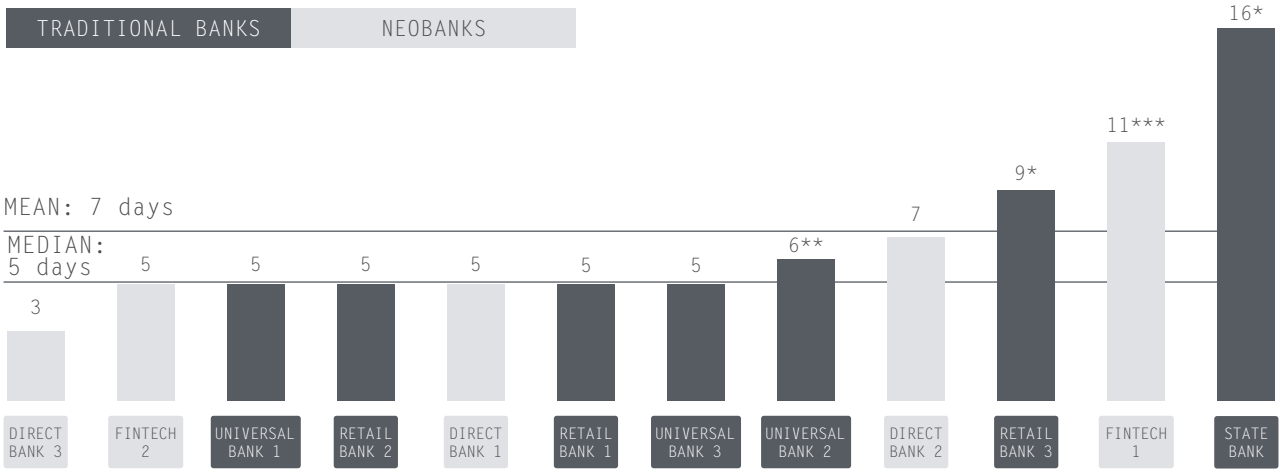
Fintech 1 which is a leading neobank based in the U.K., scored the second worst result, requiring 11 days to provide the bank card.

Retail Bank 3 and **Direct Bank 2** also did not perform well, requiring between six and seven days to provide the bank card.

The remaining sample banks remained nearly level through the time and variance of between three to five days. This poor performance is often due to the fact that many banks send the bank card by post in connection with a huge amount of paperwork which additionally requires the activation of the banking card.

> *"I had to wait for almost two weeks to get my card delivered, since I've chosen the free version (+ €5.99 for delivery). But once it arrives, it has a unique, creative unpacking experience!"*

TIME TO RECEIVE CARD (DAYS)



Data refers to 12 out of 14 banks where our users completed onboarding;
*Duration includes the online submission of application forms, as documents needed to be printed, signed and sent back.
**Duration excludes time to get an appointment at the branch, as foreign citizens are forced to visit the branch.
***Bank offers the option to get card faster at an extra charge, with features to track card shipment.

OUR RECOMMENDATIONS

Our onboarding recommendations for today's banks can be broken down into four key themes:

1. REDUCE THE BURDEN ON CUSTOMER TIME AND EFFORT

- Accelerate processes, utilize signature tools
- Don't waste customers' time in asking what you can already gather yourself from prior answers or data logic
- Reduce the number of physical mailings by providing a clear, easy-to-select option to submit and host all information digitally and ensure access to this data at all times (it shouldn't only be for a year, requiring the user to save or print out the files).

2. ENHANCE DIGITAL EXPERIENCE

- Provide customization opportunities along the way
- Ensure an attractive and clear UI which conveys a sense of control
- Ensure all relevant information is readily accessible
- Auto-complete personal data, in-form tax determination, reduction of text to relevant information
- Provide a chatbot function to field general queries and to promote greater self-service
- Ensure a seamless, end-to-end onboarding experience whichever device the customer chooses.

3. BETTER MANAGE CUSTOMER EXPECTATIONS

- Effectively communicate with the user and manage their expectations. One British fintech did this particularly well. Our user was happy to wait for two weeks instead of paying extra for an expedited offering, so overall, the CX did not suffer
- If connectivity issues can't be countered, identify and implement a measure to reach out and acknowledge your users' frustrations
- Utilize a feedback loop to source and implement improvement ideas from customers, then showcase enhancements.

4. RE-EVALUATE CHOICE OF ID VERIFICATION PROVIDERS

- Ensure your ID verification provider offers as much coverage as possible
- Degree of integration matters to accelerate each process and reduce connection issues
- Customize their scripts for your customers, a simple greeting at the start of the process would be a vast improvement in treating your customers with respect
- Suggest the best browser connection (i.e. Google Chrome) to avoid connection issues.

The key to success in overcoming challenges in the global financial industry is to deliver premium customer experience journeys. We believe growth and retention in the banking industry will only continue to be possible with a fundamental change from a product-and-compliance-obsessed view to a customer-centric digital mindset.

In the past, there has been lip-service paid to improving CX – banks have mainly prioritized short term business growth. Increased market competition means that there should be significant investments made to improve CX, to remove friction, increase engagement, and ensure measurement and learnings are addressed along the way. The first experience a potential customer will have with a bank is through onboarding – this is their very chance to make a good strong impression.

ABOUT CAPCO

Capco is a global technology and management consultancy dedicated to the financial services industry. Our professionals combine innovative thinking with unrivalled industry knowledge to offer our clients consulting expertise, complex technology and package integration, transformation delivery, and managed services, to move their organizations forward.

Through our collaborative and efficient approach, we help our clients successfully innovate, increase revenue, manage risk and regulatory change, reduce costs, and enhance controls. We specialize primarily in banking, capital markets, wealth and asset management and insurance. We also have an energy consulting practice in the US. We serve our clients from offices in leading financial centers across the Americas, Europe, and Asia Pacific.

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