Part 01

Bank 2050

1 Getting Back to First Principles

Everybody has a plan until they get punched in the mouth.
—Mike Tyson

Banking isn't rocket science, but as it turns out, rocket science is a great analogy for the future state of banking. Putting men on the moon is, to date, perhaps the greatest endeavour mankind has committed to. It inspired generations and, until we successfully put boots on the surface of Mars, will likely remain the single most significant technological and scientific achievement of the last 100 years. Getting men to the moon required massive expenditure, incredible advances in engineering, a fair bit of good old fashion luck and the "right stuff".

Before the US could get Neil Armstrong all the way up to the moon, they needed the right stuff in a different area—in figuring out the science.

At the end of World War II there was a very serious plan that would set the foundation for the entire Space Race and Cold War. It was the race for the best German scientists, engineers and technicians of the disintegrating Nazi regime. The predecessor to the CIA, the United States' OSS (Office of Strategic Services), were instrumental in bringing more than 1,500 German scientists and engineers back to America at the conclusion of World War II. The highly secretive operation responsible for this mass defection was codenamed "Overcast" (later to be renamed Operation "Paperclip"). The primary purpose of this operation was denying access to the best and brightest Nazi scientists to both the Russians and the British, who were both allies of the US at this time. "Paperclip" was based on a highly secretive

document known within OSS circles as "The Black List", and there was one single name that was right at the top of that list: Wernher von Braun.

In the final stages of World War II, von Braun could see that the Germans were ultimately going to lose the war, and so in 1945 he assembled his key staff and asked them the question: who should they surrender to? The Russians, well known for their cruelty to German prisoners of war, were too much of a risk—they could just as easily kill von Braun's team as utilise them. Safely surrendering to the US became the focus for von Braun's own covert planning in the closing days of World War II. The question he faced was how to surrender without the remnants of the Nazi regime getting tipped off and putting an end to his scheme.

For this von Braun had to, twice, manipulate his superiors, forge paperwork, travel incognito and disguise himself as an SS officer to create a very small window of opportunity for surrender. Convincing his superior that he and his team needed to divert from Berlin to Austria, so that the V-2 rocket team was not at risk by invading Soviet forces, von Braun engineered an opportunity to surrender himself and his brother to the Americans. In the end, Magnus von Braun just walked up to an American private from the 44th Infantry Division on the streets of Austria and presented himself as the brother of the head of Germany's most elite secret weapons program[1].

> Suddenly a young German came to members of Anti-Tank Company, 324th Infantry and announced that the inventor of the deadly V-2 rocket bomb was a few hundred yards away—and wanted to come through the lines and surrender. The young German's name was Magnus von Braun, and he claimed that his brother Wernher was the inventor of the V-2 bomb. Pfc Fred Schneikert, Sheboygan, Wis., an interpreter, listened to the tale and said just what the rest of the infantrymen were thinking: "I think you're nuts," he told von Braun, "but we'll investigate."
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> —The Battle History of the 44th Infantry Division: "Mission Accomplished"

Private First Class Fred Schneikert likely presided over the single greatest intelligence coup of World War II, save maybe for the capture of U-570 and its Enigma cipher machine.

To understand von Braun and his willingness to work on a WWII weapon of mass destruction like the V-2 rocket (which is estimated to have killed 2,754 civilians in London, with another 6,523 injured[2]), it needs to be understood that he simply saw the Nazi ballistic missile program as a means to an end. In von Braun's mind, the V2 was simply a prototype of rockets that would one day carry men into space—that was his end game.

The images and engineering principles of spacecraft we have from the 1950s we owe largely to von Braun's designs. The three-stage design of modern rockets, the chosen propellants and fuel, the recovery ship system for returning capsules, the initial NASA designs for space stations and Mars programs, all came from von Braun's early musings and engineering drawings. Sixteen years after von Braun's surrender to Allied forces, President John F. Kennedy Jr announced that by the end of the decade the US would put a man on the moon. It would be in a rocket built by Wernher von Braun.

The Saturn V was an astounding piece of engineering. Today, it remains the largest and most complex vehicle ever built. A total of 13 Saturn Vs were launched between 1967 and 1973 carrying the Apollo and Skylab missions. The Saturn V first stage carried 203,400 gallons (770,000 litres) of kerosene fuel and 318,000 gallons (1.2 million litres) of liquid oxygen needed for combustion. At lift-off, the stage's five F-1 rocket engines produced an incredible 7.5 million pounds of thrust, or about 25 times that of an Airbus A380's four engines at take-off. In today's money, each Apollo launch and flight cost around $1.2 billion.

However, despite the incredible advances of von Braun's program in the 1950s and 1960s, manned spaceflight hasn't progressed significantly since. In fact, one could argue that the US' capabilities in this area have been declining ever since Apollo. On 20 July 1969, the Americans landed Neil Armstrong and Buzz Aldrin on the lunar surface, but after December 1972 no further manned missions were launched. In the 1980s the US had the Space Shuttle and could get to low-earth orbit, but today they

are renting seats on Russian Soyuz vehicles to get NASA astronauts to the International Space Station.

First principles design thinking

While the cost of launching commercial payloads into space has decreased by some 50–60 percent since the Apollo days, the core technology behind the space industry has simply gone through multiple derivative iterations of von Braun's initial V-2 work. The rocket design, production process, and mechanics all are essentially based on the work of NASA in the Apollo era, which itself was based on the V-2 design. This process of iterative design, or engineering, is known to engineers as "design by analogy"[3].

Design by analogy works on the philosophy that as engineering capabilities and knowledge improve, engineers find better ways to iterate on a base design, perhaps finding technical solutions to previous limitations. But design by analogy creates limitations in engineering thinking, because you're starting with a template—the work is derivative. To create something truly revolutionary you have to be prepared to start from scratch.

Enter Elon Musk. Like von Braun, Musk has an unyielding vision for space travel. Musk isn't interested in just returning to the Moon though, he has his sights set on Mars. For Musk, this is about nothing short of the survival of humanity. In discussing his obsession with Mars, Musk refers to the fact that on at least five occasions the Earth has faced an extinction level event, and that we're due for another one at any moment. We've had dinosaur-killer scale asteroids sail past Earth on near collision courses on multiple occasions in recent years, too. Thus, Musk argues, we must build the "insurance policy" of off-world colonies.

After his successful exit from PayPal, Musk created three major new businesses: Tesla, SpaceX and Solar City[4]. Instrumental in Musk's approach to each of these businesses was his belief in the engineering and design concept called *first principles*. Unlike design-by-analogy or derivative design, first principles take problems back to the constituent components, right back to the physics of the design—what the design was intended to do. A great example of first principles design is the motor vehicle. At the time that Carl Benz invented the first two-seater lightweight gasoline

car in 1885, everyone else was trying to optimise carriage design for use with horses. Benz took the fundamentals of transport and applied the capabilities of the combustion engine to create something new.

> I think it's important to reason from first principles rather than by analogy. The normal way we conduct our lives is we reason by analogy. [With analogy] we are doing this because it's like something else that was done, or it is like what other people are doing. [With first principles] you boil things down to the most fundamental truths…and then reason up from there.
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> —Elon Musk, YouTube video, First Principles[5]

To get to Mars, Musk has reckoned that we need to reduce the cost to orbit by a factor of 10. A tall order for NASA, a seemingly impossible task for a software engineer who had never built a rocket before. As noted in Musk's recent biography (Vance, 2015), Musk has the unique ability to learn new skills to an extremely high level of proficiency in very short time frames. Thus, when it came to rocket design, he simply taught himself—not just the engineering of pressure vessels, rocket engine chambers and avionics, but the physics behind every aspect of rocketry—and even the chemistry involved. Musk reasoned, if he was to start from scratch based upon the computing capability, engineering techniques, materials sciences and improved physics understanding we have today, would we build rockets the same way we had for the last 50 years? The answer was clearly no.

In 2010 NASA was paying roughly $380 million per launch. SpaceX currently advertises a $65 million launch cost for the Falcon 9, and $90 million for the Falcon Heavy. SpaceX's current cost per kilogram of cargo to low-earth orbit of $1,100 is well below the $14,000–39,000 per kilogram launch cost of United Launch Alliance, the lowest priced direct competitor for SpaceX in the United States.

The last major manned space program of the US, the Space Shuttle program, averaged a cost per kilo to orbit of $18,000. Now that SpaceX has figured out how to land their first stage vehicles back on land and on their oceangoing drones[6], such as JUST READ THE INSTRUCTIONS

and VANDENBERG OF COURSE I STILL LOVE YOU[7], the reusability factor will reduce their cost per kilo to orbit of their Falcon Heavy launch vehicle down to around $400 over the next few years. This means that SpaceX will have reduced the cost to orbit by more than 90 percent in the 14 short years of their commercial operations. NASA's nearest competitor to the Falcon Heavy will be the Space Launch System, with a payload capacity of 70 metric tons, and an expected launch cost of $1 billion per launch. The Falcon Heavy at 64 metric tons and $90 million per launch represents one-tenth of the cost, before reusability.

Figure 1: Part of the secret to lower cost is advancements SpaceX has made in integrated manufacturing.

A greater than 90 percent cost to orbit reduction, reusability with rockets that land themselves, and a fuel source that is easily manufactured and stored on Mars.

Welcome to the revolutionary benefits of first principles design thinking.

The first principles iPhone

Musk isn't the only one to believe in the philosophy of first principles design. Steve Jobs was a believer in getting back to basics for redesigning well-worn concepts. Instead of iterating on the famous Motorola flip

phone, the Blackberry, or the Nokia "Banana" phone, Jobs started from scratch in reimagining a phone, browser and iPod combined into a personal "smart" device.

> There's the great story about how Steve carried a block of wood around the office while the team was creating the iPhone. He wanted to remind everyone around him that things should be simple. Jobs understood that technology is only as powerful as the ability for real people to use it. And it's simple, usable functionality—not ridiculous over engineering—that makes for technological power.
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> —Bill Wise, MediaBank, quoted in *Business Insider*, 12 October 2011

Now in fairness, Jobs may have got the "block of wood" prototyping idea from Jeff Hawkins, the lead inventor of the PalmPilot. The story goes that when he first imagined the PalmPilot, he carried blocks of wood the approximate size of the device he would later build around with him everyday. Whenever Hawkins saw a need for the device in his daily routine, he would tap on it, scribbling on the block of wood, or in his notebook, simulating or prototyping how the device might be used to solve that problem, whether it was a calendar entry, jotting down some notes or swapping contact details with a colleague.

Figure 2: The iPhone is a great example of first principles product design.

Jobs and Jony Ive, Apple's chief design officer, didn't try to iterate on an existing device design and improve on it; they started from scratch. It's why the iPhone ended up with a revolutionary touch screen design, aluminium housing, no keyboard and an app ecosystem. Do you remember the debate when the iPhone launched over the value of the Blackberry RIM keyboard versus Apple's lower accuracy touch screen keyboard? Many commentators were sure the Blackberry keyboard would win out. But it didn't.

Why am I focusing on this? Ask yourself a couple of simple questions. If you were starting from scratch today, building a banking, monetary and financial system for the world, a banking system for a single country or geography or just designing a bank account from scratch, would you build it the same way it has evolved today? Would you start with physical bank branches, insist on physical currency on paper or polymers, "wet" signatures on application forms, passbooks, plastic cards, cheque books, and the need to rock up with 17 different pieces of paper and three forms of ID for a mortgage application?

No, I'm sorry—that's just plain crazy talk. If you were starting from scratch with all the technologies and capabilities we have today, you would design something very, very different in respect to how banking would fit into people's lives. Let us then apply first principles to banking and see if there are any examples of this type of thinking emerging today. Are we seeing systems emerge that are fundamentally different?

Applying first principles to banking

The banking system we have today is a direct descendent of banking from the Middle Ages. The Medici family in Florence, Italy, arguably created the formal structure of the bank that we still retain today, after many developments. The paper currency we have today is an iteration on coins used before the first century. Today's payments networks are iterations on the 12th century European network of the Knights Templar, who used to securely move money around for banks, royalty and wealthy aristocrats of the period. The debit cards we have today are iterations on the bank passbook that you might have owned if you had had a bank account in the

year 1850. Apple Pay is itself an iteration on the debit card—effectively a tokenised version of the plastic artifact reproduced inside an iPhone. And bank branches? Well, they haven't materially changed since the oldest bank in the world, Monte Dei Paschi de Sienna, opened their doors to the public 750 years ago.

When web and mobile came along, we simply took products and concepts from the branch-based system of distribution and iterated them to fit on to those new channels. Instead of asking the question whether we need an application form in the online process at all, we just built web pages to duplicate the process we had in the branch[8]. For many banks and regulators today, they are still so married to this process of a signature on a piece of paper and of mitigating risk to the bank through a legal physical paper record, that in many parts of the world you still can't open a bank account online or on your phone—and that's a quarter of a century after the commercial internet was launched.

Think about the absurdity of that situation for a moment. We're tied to using a first century artifact, namely a "wet signature" to uniquely and securely identify an individual for the purpose of opening a bank account. But signatures aren't secure, they aren't regularly verified, they aren't really unique, they are easily compromised, easily copied, and in the case of an identity thief using stolen or fabricated identity documents, a signature provided might not bear any resemblance to the authentic account owner's actual signature—as long as it is the first signature that particular bank gets, then they have to presume the signature matches the owner of the account.

Don't even get me started on branches[9].

Hence the big question. If you started from scratch today, designing a new banking system, would any of the structures we are used to seeing survive? If not, like Elon Musk's approach to SpaceX rockets or Steve Jobs' approach to smartphones, the only way we're going to get exponential progress and real efficiencies is through a first principles rethink of the banking system.

So, what would a "first principles" bank or bank account look like today?

In first principles, utility is king

Let's strip it down to the constituent physics, as Musk suggested. What does a bank do that no other organisation can do, or at least do consistently well? Or what do we rely on banks to provide that would remain in a re-imagined, first principles version of banking?

I would suggest banks have traditionally provided three core pieces of utility:

1. **A value store**—The ability to store money safely (investments fall into this category)
2. **Money movement**—The ability to move your money safely
3. **Access to credit**—The ability to loan money when you need it

If you describe the essence of what you want from your bank as a customer (and it doesn't matter whether that is as a retail consumer or as a business owner), ultimately you don't start off with saying I need "product A" or "product B". Ultimately, you come up with stuff like:

- "I need to keep my money safe."
- "I need to send money fast."
- "I need to save money for [insert need/dream/wish here]."
- "I need my employer to be able to pay me."
- "I can't afford to buy this thing and I need some short-term credit."
- "I need to be able to pay my staff."
- "I want to buy a home."
- "I need to pay this bill."
- "How am I going to pay when I'm in another country?"
- "How do I make more money to pay my bills?"

Whenever we talk about what a bank does for us, or what we need from our bank, we generally don't describe channels, bank departments or products—we describe utility and functionality. Banks have tried very, very hard to train us to think in terms of products, and to some extent they have been successful.

Since the emergence of banking during the 14th century, as banks we've taken that core utility and we've added structure. Initially this

structure was about network—*where* you could bank. Banks then added structure around the business of banking, trust and identity—*who* could bank, what was a bank and how you had to bank. Today you could argue that these structures have been reducing risk to both banks and consumers, rather than reducing risk or complexity around utility. Today, as users of banking, we must fight through more friction than ever before just to get to that underlying utility.

Technology now affords us the ability to radically eliminate that friction and create banking *embedded* in the world around us, delivering banking when and where we need it the most. My good friend Chris Skinner calls this "Semantic Banking".

> The semantic web today is all around us. It is immersive, ubiquitous, informed and contextual. The semantic bank will have these features, too. It will prompt us with the things we need, and warn us against doing things that will damage our financial health. It will be personalized, proactive, predictive, cognitive and contextual. We will never need to call the bank, as the semantic bank is always with us, non-stop and in real-time. As a result, nearly every bank function we think about today—paying, checking, reconciling, searching—go away as the semantic bank and web do all of this for us. We just live our lives, with our embedded financial advisor and the core utility of banking as an extension to our digital lives.
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> —Chris Skinner, author of *ValueWeb*

In a world where banking can be delivered in real time, based on predictive algorithms and surfaced using voice-user interfaces like Alexa and Siri, in a mixed-reality head-up display like Magic Leap or HoloLens, in an autonomous car or home, or just in increasingly smarter watches and phones that you carry everywhere, banking simply becomes both embedded and ubiquitous. But let's be clear—it is not the bank products of today that will ultimately become embedded in this smart world. Only the purest form of banking utility.

When it comes to this new augmented world, banks are significantly disadvantaged over the real owners of utility, and they must constantly jostle for a seat at the new table. The utility today isn't via a branch or an ATM, but the smartphone, the IP layer, data, interfaces and AI.

In this emerging world of instant payment utility, for example, the artifacts and products we associate with payments today—hard currency, cheque books[10], debit and credit cards, wire transfers, etc—will simply disappear. Ultimately, they represent only structural *friction* in enabling payment utility. A good illustration of this is the capability we see emerging in the likes of Amazon Echo[11] or Google Home, where you can now conduct simple commerce and transactions by using your voice. As smart assistants like this get smarter, we're going to delegate more and more of our day-to-day transactional and commerce behaviour to an AI-based agent[12]:

"Alexa, pay my telephone bill."

"Siri, transfer $100 to my daughter's allowance account."

"Cortana, can I afford to go out for dinner tonight?"

"Alexa, reorder me a pair of Bresciani socks."[13]

In this AI and agency-imbued world, utility is the core—products become invisible as they are transformed into everyday, technology-embedded experiences.

In a world where you delegate Amazon Alexa to make a payment on your behalf, triggered by your voice, does the airline miles program you have linked to your credit card make any difference which payment method you choose? I'd argue, absolutely not. Once you have configured Alexa with your preferred payment method, the improved utility will simply demand more and more transactions go through that account—you won't stop a voice transaction to get your physical card out and read 16 digits to Alexa. The promise of rewards simply won't be enough to disrupt that core payment utility.

Amazon, Apple, Facebook, Alibaba and others own those layers of technology that deliver experiences and utility today. Banks are already being forced to submit to app store rules just to be a part of their ecosystem. If you're a bank that does a deal with Uber or Amazon to provide some sort

of bank utility to an Uber driver or an Amazon small business, you have the advantage of access and scale, but you no longer "own the customer". It's no longer about having a building on the High Street or a piece of paper you can sign, it's about the most efficient delivery of banking to the customer in real time.

We've been hearing about the threat of the "Facebook of banking", the "Uber of banking", or the "Amazon of banking" for many years now, but if you step back from the hype, we've already seen the emergence of new *first principles* competitors.

A bank that is always with you

In a host of countries around the world you can instantly sign up for a bank or mobile money account on your phone in minutes. In countries like China, Kenya, Canada, US, UK, Australia, Thailand, Singapore, Hong Kong and throughout Europe you can pay by simply tapping your phone or scanning a bar code. You can send money to friends via the internet instantly in more than 190 countries today[14]. You can pay bills in real time and increasingly just let your phone or bank account look after those payments for you. Real *first principles* thinking in banking isn't happening in established, developed economies. The real action is in emerging markets or developing countries where legacy is poor.

In 2005 if you lived in Kenya there was a 70 percent chance you didn't have a bank account, nor could you store money safely and it's unlikely you were saving, unless it was under your mattress. Today, if you're an adult living in Kenya there's a near 100 percent likelihood that you have used a mobile money account (stored in your phone SIM), and that you can transfer money instantly to any other adult in Kenya. Today, data shows that Kenyans trust their phone more than they trust cash in terms of safety and utility, with people sewing sim cards into their clothes or hiding them in their shoes so they can more safely carry their money with them. This is all possible because of a mobile money service called M-Pesa, created by the telecommunications operator Safaricom. Today at least 40 percent of Kenya's GDP runs across the rails of their mobile money service called M-Pesa[15].

> We're currently sitting at about 22 million customers out of a total mobile customer base of about 26 million. Now, if you take the population of Kenya as being 45 million, half of whom are adults, you can see we're capturing pretty much every adult in the country. We are transmitting the equivalent of 40 percent of the country's GDP through the system and at peak we're doing about 600 transactions per second, which is faster and more voluminous than any other banking system.
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> —Bob Collymore, CEO of Safaricom/M-Pesa[16]

The road to 100 percent financial inclusion via mobile wasn't without its challenges. In December of 2008, it was reported in Kenya's *The Star*[17] that a probe instigated by the finance ministry was actually as a result of pressure coming from the major banks in Kenya. By this stage it was already too late for the banks. By 2008, M-Pesa was already in the pockets of more Kenyans than those that already had a conventional bank account. The impact M-Pesa was already having on financial inclusion in Kenya meant the regulator simply wasn't going to shut it down to curry favour with the incumbent banks. Financial inclusion was a bolder ideal than incumbent protection.

Figure 3: M-Pesa is a first principles approach to financial inclusion.

Today there are more than 200,000 M-Pesa agents or distributors spread across Kenya. More than every bank branch, ATM, currency exchange provider or other financial providers. Those M-Pesa agents are at the heart of the ability to get cash in and out of the network, but being a part of that network allows them to accept mobile payments for goods and services also. It is not unusual to find M-Pesa agents who have trebled their business since taking on M-Pesa, or those that see 60–70 percent of in-store payments being made via a phone. On average, the central bank estimates that the average Kenyan saves 20 percent more today than the days prior to mobile money.

Kenya isn't the only one to have found the mobile to be transformational for financial access. Today there are more than 20 countries[18] in the world where more people have a value store or account on their mobile phone than via a traditional bank. In sub-Saharan Africa, a population of close to 1 billion people is amongst the least banked population in the world, with fewer than 25 percent of them having a traditional bank account. However, today more than 30 percent of them already have a mobile money account, and that is growing year on year by double digits. If you wanted to bank these individuals in the traditional way, you'd need to get them to a bank branch and they'd need a traditional form of identity. Research by Standard Bank in 2015 showed that 70 percent of these so-called "unbanked" people would have to spend more than an entire month's salary just on transportation to physically get to a branch. Branch-based banking was actually guaranteeing financial exclusion for these individuals.

The introduction of mobile money accounts has also had a profound effect on the banking system. The big banks that once plotted to kill M-Pesa have found incredible opportunities for expanding their horizons.

> When I took this job two years ago my vision was that we were not delivering the experience the customers were asking us to, we were stuck in the traditional mode of asking customers to come to the branch. I wanted an account where you can use your mobile device to get our services. So when we started [working with M-Pesa]

> we had a target to reach 2.5 million customers in one year, but then in just one year we had already reached 7.5 million customers. We had kind of broken all the goals that we set up for ourselves...our credit products have already done $180 million so far.
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> —Joshua Oigara, CEO of Kenya Commercial Bank[19]

Kenya Commercial Bank quadrupled their customer base from just over 2 million customers to more than 8 million customers in just two years by deploying a basic savings and credit function on top of the M-Pesa rails. A 124-year-old bank that took 122 years to reach its first 2 million customers, and just two years to reach the next six million. That's all thanks to mobile. Another Kenyan bank, CBA, had equally as impressive results, going from just tens of thousands of customers to more than 12 million today, thanks to their M-Shwari savings product that they launched on top of the M-Pesa rails. Pre M-Pesa just 27 percent of the Kenyan population was banked; today almost every adult in Kenya has a mobile money account. That is a revolutionary transformation.

While M-Pesa's effect on financial inclusion has been nothing short of phenomenal, the really big numbers aren't happening in Africa, they're happening in China. The transaction volume of Chinese mobile payments reached 10 trillion[20] Chinese yuan (US$1.45 trillion) in 2015[21], and they reached 112 trillion yuan (US$17 trillion) in 2017. In comparison, the equivalent figure for mobile payments in the United States stood at a meagre US$8.71 billion in 2015[22] and US$120 billion in 2017, less than 0.1 percent of China's traction. Even though the US is expected to approach $300 billion on mobile payments in 2021, they're still not even within shouting distance of China in terms of per capita volume, transaction volume or mobile payments adoption rates. In 2018, China's mobile payments activity will overtake global plastic payments—that's the scale we're talking about. That meteoric growth is down to several factors, but most notably because China is today dominated by non-bank payments capability on mobile that has massive, massive scale due to non-bank ecosystems.

By the end of 2015 more than 350 million Chinese were regularly using their mobile phones to purchase goods and services that exceeded

750 million in 2017. Alipay is handling a huge portion of that traffic, making it the world's largest payments network by a wide margin, but WeChat Pay exceeded both Mastercard and Visa in transaction volume in 2017 as well. To help you understand how much larger Alipay is than conventional payments networks, in 2015 Visa reportedly peaked at 9,000 transactions per second across their network, while Alipay delivered 87,000 transactions per second at peak—almost 10 times that of Visa. Alipay is now available in 89 countries across the globe, and Jack Ma is expanding that rapidly. On 11 November 2017 alone, Alipay settled RMB 159.9 billion (US$25.3 billion) of gross merchandise volume (GMV) through its network—84 percent of that via mobile handsets.

Given that PayPal, Apple Pay, Android Pay and Samsung Pay hit US$9 billion in mobile payments volume for the same year, the US is significantly behind China. Visa's market cap today is $260 billion. In comparison Ant Financial (Alipay's parent company) looks like a huge buy opportunity right now, with a valuation at their last investment round of approximately $150 billion[23]. The mobile payments market in China is growing at 40–60 percent year on year and Ant Financial (Alipay) and Tencent (WeChat/WePay) claim more than 92 percent of that volume today[24]. Yes, you read that correctly, 92 percent of mobile payments in China are handled by two tech players—not by UnionPay, Mastercard, Visa, Swift or the Chinese banks. By tech companies. In Q1 of 2017, mobile payments accounted for 18.8 trillion yuan (US$2.8 trillion) in China, and they finished out the year with a staggering US$17 trillion in volume.

Ant Financial has demonstrated better than any other company in the world, with the possible exceptions of Starbucks[25] and WeChat, the ability to leverage mobile for deposit-taking and payments. In 2017, Alipay, through their Yu'e Bao wealth management platform, managed $226 billion in AuM (and growing)—all via mobile and online channels. Alipay has no physical branches for taking deposits. It is the largest money market fund in the world today[26] beating out JPMC's US treasury bond market fund. Yu'e Bao has proved that the most successful channel in the world for deposit-taking is not a branch, it's your mobile phone. Something that is only viable using first principles thinking.

This has spurred a mobile deposit and payments war in the Middle Kingdom with Apple, Tencent, UnionPay and Baidu launching their own competing initiatives. WeChat's online savings fund raked in US$130 million just on its first day of operation. The downside for Chinese banks is that now that a quarter of all deposits have shifted to technology platforms, the cost of liabilities and the risk to deposits has increased by 40 percent[27]. Competitors building new branch networks aren't the threat, the utility of mobile and messaging platforms are.

With the largest mobile deposit product in the world, access to more than 80 countries, investments in US-based Moneygram, Korea's Kakao Pay, Philippines GCash (Globe Telecom), Paytm in India and others, Ant Financial is no longer just an internet-based payments network in China. Today, Ant Financial is on track to become the largest single financial institution in the world. Seriously.

Within 10 years, based on current growth, Ant Financial will be valued at more than US$500 billion, and by 2030 it will likely be approaching $1 trillion in market cap value. This would make it four times bigger than the largest bank in the world today, ICBC of China. Today, Ant Financial is worth roughly the same as UBS and Goldman Sachs, two of the most well-respected banking players in the world. Ant Financial has a first mover advantage as a true first principles financial institution built upon the utility of mobile. Ant Financial is not a bank, it is a FinTech, or more accurately a *TechFin* company—a technology company focused on financial services.

Ant Financial is clearly the 800-pound Unicorn in the bunch, but when you look for first principles in financial services, you see an overwhelming representation by FinTechs, startups, tech companies and pure-plays. I guess that's the nature of it—for an incumbent to go back to first principles they'd have to burn it all down and start again. Even when you look at the more innovative incumbent banks in the world, banks like mBank, BBVA, CapitalOne and DBS, you still rarely see evidence of even an iPhone-type "first principles" product design—it is still vastly skewed towards reducing friction for derivative products; design by analogy again. Products that were essentially created for distribution through physical branches are simply being retrofitted on to digital channels. For example, DBS' Digibank in

India and Atom Bank of the UK are just digital treatments of traditional bank products and services fitted onto a mobile phone—they're derivative. Yes, they are mobile or digital optimised, but the product features and names all remain essentially the same as those you would have received from branches in the past.

For example, we haven't seen incumbent banks come up with a savings capability that isn't APR[28] based, or where interest isn't received in anything but a very traditional manner—with one possible exception. Dubai-based Emirates NBD launched a savings product in 2016 that allowed customers to be rewarded based on physical activity measured via a wearable device that counted steps. Well played, Emirates NBD.

Other examples of first principles approaches to savings have all come from FinTechs. Digit and Acorns are two examples of behaviourally-based approaches to savings—apps that modify people's day-to-day behaviour to save more, not just simply offering a higher interest rate for holding your deposit longer. Fidor was the first bank in the world to launch an interest rate based on social media interactions[29].

We haven't seen the incumbent industry come up with credit products that aren't based on the same models we've seen for hundreds of years. PayPal Mafioso Max Levchin launched Affirm in 2014, which provides credit based on buying patterns, geolocation and behaviour. We've seen Grameen in Bangladesh pioneer micro-credit and Zopa in the UK pioneer P2P lending, but the banks that followed were largely derivative of these pioneers. You don't see banks reinventing credit based on behavioural models.

We have very rarely seen incumbent players abandon their reliance on application form-based credit scoring or reference checks to determine someone's suitability for a loan or credit card. Yet we see startups like Sesame Credit (Ant Financial), Lenddo and Vouch experiment with social-based scoring, and LendUp creating loans that boost credit scores for consumers instead of simply rejecting them.

When it comes to money itself, you can't effectively argue that Bitcoin isn't a first principles approach to the problems of currency, identity and the challenges of cross-border digital transfers. When you look at the money

transfers themselves, you don't see players like SWIFT, Western Union or others using first principles or adapting blockchain (yet) to solve the problem, but you do see M-Pesa, Abra, Ripple and others solving money movement issues with great aplomb.

Distributed ledger technology like the blockchain clearly has the potential to be a first principles platform for a range of things, the most illustrative example being the creation of the DAO or decentralized autonomous organisation. It was the first AI-based company that allowed participants to invest Ether cryptocurrency into Ethereum/Blockchain startups managed purely on a code and consensus basis. Technically the DAO was a stateless, cryptocurrency based, investor-directed venture capital fund, with no risk or compliance officers, no management, and no traditional company structure. You can't argue that this isn't a first principles approach to VC investment.

When you look for first principles approaches to banking you can find plenty of examples, just not amongst incumbent banks. That is the threat.

Is it too late for the banks?

Elon Musk's SpaceX isn't the only company in the world to make rockets today, but it does have the cheapest kilogram-to-orbit platform. Tesla isn't the only electric vehicle in the world, but it is the most widely known and sold, and has reframed the motor vehicle industry with the likes of Volvo and others responding in kind because of Tesla's success. Apple's iPhone isn't the only smartphone on the planet, but it did completely redefine what we considered a phone and personal computing device. Daimler and Benz aren't the only automobile manufacturers in the world, but you don't see horses on our streets today because of their first principles approach to transportation.

Ant Financial, Tencent, Safaricom and thousands of FinTech startups are redefining what it means to bank today. Redefining how people use a bank account, or more accurately a value store that is embedded in their phone.

Bank 4.0, however, will be about more than new value stores, payment and credit utility. Bank 4.0 is going to be embedded in cars that can pay

in a drive-through without the need for plastic, or autonomous vehicles that generate their own income and pay their own road tolls. Bank 4.0 is going to be embedded in voice-based smart assistants like Alexa and Siri, available at your command to pay, book, transact, enquire, save or invest. It is going to be embedded in mixed-reality smart glasses that can tell you, just by looking at something—like a new television or a new car—whether you can afford it. Bank 4.0 is about the ability to access the utility of banking wherever and whenever you need a money solution, in real time, tailored to your unique behaviours.

The emergence of Bank 4.0 means that either your bank is embedded in the world of your customers, or it isn't. It means that your bank adapts to this connected world, removing friction and enabling utility, or it becomes a victim of that change. The bankers of tomorrow are not bankers at all—the bankers of tomorrow are technologists who enable banking experiences your customers will use across the digital landscape. The bankers of today, the bank artifacts of today, the bank products of today, are all on borrowed time.

Is it too late for the banks? In one sense, yes. This transformation into the semantic, augmented world is happening because of a whole range of technology changes outside of banking, and the constant demand by consumers for the next big thing. The only way banks could hope for first principles NOT to undermine their businesses is if they could successfully stop all adoption of new technologies like smartphones and voice-based AI. That is patently impossible. Markets that are successful in slowing down the adoption of things like mobile payments become outliers and simply look out of date in a transformed world.

Case in point. Two-thirds of the world's cheques today are written in the United States, along with the highest card fraud volume in the world, and as you read earlier the volume of mobile payments in the US is fractional compared with the likes of China. This outlying behaviour is permitted by a system suffused with legacy, payments regulation ruled by consensus, point-of-sale architecture that is a decade behind the rest of the world, and reluctance by incumbents to remove this embedded friction because it will weaken their oligopolies. However, the fact remains: when

it comes to mobile payments, Kenya is a far more advanced economy than the United States. When it comes to financial inclusion, Kenya has done more to improve the lot of its populace in the last 10 years than the US has in the last 50 years through legislation like the Community Reinvestment Act. Indeed, Kenya today has higher financial inclusion than the United States—a mind-blowing and clearly inconvenient statistic.

The US banking system is a macro example of design by analogy versus design by first principles, whereas China and Kenya are becoming the opposite. The more legacy behaviour and regulation your economy has supporting the friction of the old system, the harder it will be for your bank to be 4.0 ready because it forces slow adaptation to new technology. It is why London and Singapore are pushing so hard for regulatory reform in financial services—they know that is how the future centres of finance will be defined in 2030 and beyond.

Ultimately, this fight will occur across the global stage, and the new metric for developed economies won't be things like GDP and economic growth, but the ability to leverage new technologies to become smart economies, the ability to enable automation, investments in smart infrastructure and the ability to capitalise transformation. Banking is a key part of the infrastructure of the global economy, but if your banking system is built on dumb rails, you will find more and more competition coming from offshore, and more and more blockchain and AI-based attempts at rendering you completely irrelevant.

If you're a bank steeped in tradition, run by lots of bankers, with an old core, in a market with tons of regulation, reliant on branch traffic for revenue then, yes, it is very likely too late. A complete transformation of a bank to being a provider of embedded banking utility, driven by behaviour, location, sensors, machine learning and AI, needs more than an innovation department, an incubator, a mobile app and a Google Glass demonstrator video.

Bank 4.0 is about that radical transformation and how the best banks in the world are responding to these shifts, and how first principles competitors are forcing us to think about banking in different ways. Bank 4.0 is about regulators that are rethinking friction, licensing and regulations

themselves. Bank 4.0 is about new capabilities, new jobs and skills that underwrite competencies banks have never needed until now. Bank 4.0 is about the ability of FinTech startups to create transformative experiences faster and cheaper than any incumbent bank could ever do.

If you want to be Bank 4.0 ready, you need to strip your bank back to first principles and rebuild. If not, it's largely just a matter of time before your business is no longer economically viable, especially if you're a bank with under $1 billion in assets. If this prospect scares you, I've successfully whet your appetite for what comes next.

If you're looking for a book that describes how you take your bank from where it is today into the world of tomorrow, then keep reading. This may be your last chance to make the necessary changes to survive through the next decade. Otherwise, feel free to continue the slow decline into obsolescence.

Endnotes

1 2 May 1945.

2 Source: British Ministry of Home Security Statistics from 1939–1945—http://myweb.tiscali.co.uk/homefront/arp/arp4a.html.

3 As we'll find out later in the chapter, this is the sole mechanism we've used to progress the banking system over the last 100 years.

4 I'm not counting Hyperloop and his LAX-based tunnelling machine, purely because they are not yet separate businesses run by Musk.

5 Elon Musk explains "first principles"—https://youtu.be/NV3sBlRgzTI (Source: Innomind.org).

6 ASDS—Automated Spaceport Drone Ship.

7 SpaceX names their ocean drones and landing platforms after ships in Iain Bank's science fiction stories from the world of the "culture".

8 In *Bank 2.0* I was able to find an example of a bank that had done this so judiciously that their online credit card application form asked you to staple proof of income to the form—an electronic form on a screen requiring a "stapled" proof of income.

9 We'll get to branches later—I assure you.

10 As only the US uses the spelling "checks", we'll use the globally accepted anglicised version in this book—cheques.

11 More generally known also as "Alexa".

12 For a more detailed analysis of this trend, please see my *Augmented: Life in the Smart Lane.*

13 Much of this is possible now, or close to possible. Check out the Alexa ad featuring Alec Baldwin, where he orders Bresciani socks.

14 This is just for PayPal coverage alone. AliPay is already in 80 countries and growing, too.

15 Source: *The Economist*—A new East Africa campaign, 9 July 2015.

16 Breaking Banks Radio interview—aired 9 February 2017.

17 Source: *The Star*—Big Banks in Plot to Kill M-Pesa, 23 December 2008.

18 Source: WorldBank—those countries include China, Kenya, Tanzania and Nigeria.

19 Breaking Banks Radio interview—aired 9 February 2017.

20 With a capital "T".

21 Source: iResearch—http://www.iresearchchina.com/content/details7_21238.html.

22 Source: CIO Magazine, "7 reasons mobile payments still aren't mainstream", James A Martin, 7 June 2016.

23 As of their $4bn capital raise April 2016. To be fair, it could be argued that they are worth well in excess of $100 billion today, based on their current revenues and activity.

24 Source: ChinaDaily.com, 3 August 2017; "Alipay, WeChat Pay vie for customers"—http://www.chinadaily.com.cn/bizchina/tech/2017-08/03/content_30337784.htm.

25 In 2016 Starbucks saw approximately $8 billion loaded onto their mobile-based "cards" (Source: Starbucks Investor call).

26 "Chinese money market fund becomes the world's biggest", *Financial Times*, 26 April 2017—https://www.ft.com/content/28d4e100-2a6d-11e7-bc4b-5528796fe35c.

27 Source: Asian Banking Journal.

28 Annual Percentage Rate.

29 Incidentally, this would technically be illegal in jurisdictions like the US today due to disclosure requirements around savings accounts that require APR rates to be published according to a strict schedule.

FEATURE

Ant Financial—The First Financial Firm for the Digital Age

By Chris Skinner

> When Alipay was created, we hoped to create an equal environment in China so that everyone can have equal access to financial support. We hoped to see that every honest person, every good person, even though penniless, can create sufficient wealth and value for one's honesty and virtues.
> —Jack Ma, Chairman of Alibaba and Ant Financial

For 20 years, I have been watching developments in financial services in China closely. My first exposure to the Chinese system was in 1997, just before the Asian financial crisis. The Bank of China proudly showed off their Beijing head office, staffed by 300,000 people, with most of it being to drive money from citizens towards government-initiated projects. There were high levels of savings and little credit availability. Customer service was of zero interest and the major focus was supporting State-Owned Enterprises (SOEs). Back then, bank tellers had to take a proficiency test in using an abacus before they were given a job.

A decade later, China had opened up to world trade and had seen a phenomenal expansion of growth in the economy. I had been caught out by the emerging social network called QQ, which had achieved 300 million users, and was amazed at how quickly the market was changing. Visiting Shanghai, you could see the change. The riverside financial district

had literally emerged from the ground up in the previous decade, and was now vying to be a global financial centre. It had a long way to go, but was getting there. Hu Jintao noted in 2006:

"From 1978 to 2003, China's GDP increased from US$147.3 billion to over US$1.4 trillion, with an average annual increase rate of 9.4 percent; its total foreign trade volume grew from US$20.6 billion to US$851.2 billion, with an average annual growth rate of 16.1 percent; and the poverty-stricken population in the rural areas dropped from 250 million to about 29 million."

I wrote extensively about the changes in China in 2006[1] and, back then, was predicting that the biggest banks in the world within a decade would all be Chinese. Today, they are:

Rank (prev)	Bank	Country	Tier 1 capital ($m)
1 (1)	ICBC	China	281,262
2 (2)	China Construction Bank	China	255,838
3 (3)	JPMorgan	US	208,112
4 (4)	Bank of China	China	199,189
5 (6)	Bank of America	US	190,315
6 (5)	Agricultural Bank of China	China	188,624
7 (7)	Citigroup	US	178,387
8 (8)	Wells Fargo	US	171,364
9 (9)	HSBC	UK	138,022
10 (10)	Mitsubishi UFJ Financial Group	Japan	135,944

Table 1: Top 10 world banks 2017. Source: *The Banker* magazine, July 2017.

Today, China's phenomenal growth has started to slow, government policies to support such growth are being questioned and concerns over the whole shadow financial system are raising global systemic worries. No matter. The country is still seeing progress and QQ is now WeChat, part of the Tencent group. The group operates alongside several other massive

Chinese internet giants, including Alibaba (the Amazon of China), Baidu (the Google of China) and more, to challenge the thinking of all.

In so doing, the country has leapfrogged their legacy competitors. America struggles with the conversion of mag stripe points of sale to migrate to chip & PIN, while Europe tries to work out how to hold together their union in light of Brexit. China, by contrast, has transformed—and specifically transformed their financial markets. Ant Financial are expected to IPO some time in the next couple of years.

However, Ant Financial go way back, beyond 2014. In fact, their humble roots began in 2003, when Alibaba came head to head with a big American giant who wanted to take root in China. That giant was eBay. Here begins a story that should fascinate everyone, especially as Ant Financial are realising the dream widely discussed in this book: the creation of a financial system for the fourth age of humanity[2].

Through a series of meetings in July 2017, I spent time in Hangzhou, China and London talking with Ant Financial and Alipay executives about their views of the past, present and future of the company. I also spent time touring China, and talking with real people about their views of the company. The following represents the summary of those experiences.

The Alibaba stories

In order to understand how Ant Financial made its mark, we first need a brief history of its origins within Alibaba. There are many ways in which you can catch up with the Alibaba story, with Porter Erisman's book, *Alibaba's World,* quite an easy read. I saw Porter present this story, from when he was involved in the early days of Alibaba, having lived in China since 1994.

The origins of Alibaba actually date back to 1980 when an Australian Communist sympathiser, Ken Morley, travelled around China on a summer vacation. When visiting Hangzhou, Ken and his family went down to the main tourist area, the West Lake. There they met a young Jack Ma who, back then, went by the name Ma Yun. Ma Yun was 16 years old, learning English, and liked to hang around the West Lake most days he could, in

order to improve his English by talking with tourists. Ken's son David was also 16 years old, and the two boys struck up an unlikely long-term relationship.

Figure 1: Ma Yun and David Morley in 1980.

From the chance encounter with the Morleys, Ma Yun started a pen pal relationship with David. They would exchange letters with Ma Yun, leaving every other line free for David's father, Ken, to make corrections to Ma's English spelling. Ken decided to see if he could help his son's young pen pal by inviting him to visit Australia in 1985 when Ma Yun, now Jack Ma, was just 21 years old.

This was when the doors of China were still firmly closed and an individual could not get a travel visa. However, Jack Ma was determined and travelled to Beijing to see if he could get permission. Seven times he

was told no. At that time, visas were only issued for service, family or studying purposes, not for general visits or tourism. So, Jack Ma almost lost all hope after his visa was rejected seven times in a row. Ken Morley was also worried about this, and even sent a telegram to the Australian embassy in China, hoping they could issue a visa for Jack Ma.

Jack Ma stayed in Beijing for a week, diligently applying for the visa every single day, as the trip to the capital cost all the money he had. The last time he stepped into the embassy, he ran towards the first visa officer he met and said: "I have been here for a week so this might be my last chance. I want my visa, and I want to talk to you seriously."

"What do you want to talk about?" said the clerk.

"I have been rejected for a visa seven times during the past week. I have no money anymore so I have to go back home. But I need to know the reason for my rejections."

Impressed by Jack Ma's persistence, the visa officer listened carefully to the story of his relationship with the Morley family and, afterwards, Jack Ma finally got his Australia visa. This changed his life and, many years later, Jack recalls: "I am very thankful for Australia for that 29 days in Newcastle [a suburb of Sydney]...when I arrived in Australia I was so shocked and amazed by the wonderful things, the people, the culture, the landscapes, the products...I was...educated in China that China was the best and richest country in the world...when I arrived in Australia I saw the world was so different."

After this, everything changed in Jack Ma's thinking, although he could not realise his dreams at that point. Instead, he returned to Hangzhou to teach English. However, his Australian trip stayed with him and, combining this with a visit to America in 1995, his life's path was clear.

Jack visited the United States in early 1995, as the first roots of search engines and trade were emerging, and this was when Jack discovered the internet. He was inspired and it changed the path of his life, creating his first business, a "Yellow Pages" for China, upon his return. The business failed but Jack was undeterred and, in 1999, Alibaba was formed. Alibaba is based upon Amazon, but it is different because it is Chinese. For example,

Amazon emerged from a Western economy that had moved from mom-and-pop stores to large malls, grocery stores and urban shopping centres. As a result, the retail model replicated the offers of these centralised centres and replaced them on margin over time.

China didn't have that structure. China in the 1990s just had the mom-and-pop stores, and no large shopping centres and malls. So, Alibaba's original idea was to create a global marketplace, connecting small Chinese businesses with the world's buyers. It was described as being an online tradeshow for Chinese businesses to demonstrate what they could do for the rest of the world, and Jack Ma sold it to Chinese firms that way. Alibaba in 1999 was building a massive Expo for Chinese business to engage with the world's manufacturers. That was the original idea, and it went well. So well that Jack Ma and his team saw an opportunity to provide a service connecting people, called Taobao. Taobao was launched in 2003, and aimed to emulate the eBay success in America, but in a different way. After all, Chinese consumers didn't buy collectables at that time, as there really wasn't anything worth collecting, or so they thought. The only thing Chinese people had that was collectable in the early 2000s was Chairman Mao's Red Book, and most people were trying to get rid of those.

This is why Taobao, which means "digging for treasure", focused upon connecting small Chinese businesses and sole traders—the mom-and-pop stores, as there weren't many big firms—to Chinese citizens. It worked, but not before being exposed and made potentially vulnerable to the entry of eBay into the Chinese markets.

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ebay is a shark in the ocean.
We are a crocodile in the Yangtze River.

If we fight in the ocean, we will lose.
But if we fight in the river, we will win.

—Jack Ma, CEO, Alibaba Group

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eBay entered China by buying heavily into its Chinese equivalent, EachNet. Jack Ma knew that eBay could eradicate Alibaba, and determined that the US auction service was not right for China. But Alibaba at the time was tiny compared to the mighty eBay, which had millions of dollars to invest in the Chinese market. However, eBay was not Chinese and did not understand Chinese markets like Jack Ma and his team at Alibaba. For example, eBay cut back on features that Chinese consumers liked, such as emoticons and animations.

Taobao ramped up these features to be a far more social commerce model, as well as adding the sprinkler of being free. eBay did not offer a free version to compete and made other mistakes, eventually pulling out of China completely, having lost millions of dollars.

At this point Alibaba had won and began to diversify into other areas. For example, Alipay was launched in 2004 as an escrow account service to allow consumers to hold funds until they were happy with the goods they received. This was key to Taobao's growth, as China had very poor consumer protection laws. In 2008, they launched Tmall, a B2C site for the sale of key branded goods and services as an offshoot of Taobao.

In 2013, Alibaba's money fund Yu'e Bao ("leftover treasure") was launched and marketed to users of Alipay. They then expanded into banking in 2015, launching MyBank during the summer and, in an audacious move, opened their bank capabilities to other Chinese banks through an open marketplace of apps and APIs.

All of these financial activities—Alipay, MyBank, Yu'e Bao, open banking—are consolidated into the brand Ant Financial. Ants are a good metaphor for the business, as ants are weak individually but together are strong. That's the message Ant Financial wanted to send to Chinese citizens and it seems to be working as Ant Financial was worth $45 billion in 2015, $60 billion in 2016 and looks likely to top $100 billion by the time of its IPO in early 2019.

Just to put this in context: what Alibaba with Taobao, Tmall, Alipay, Yu'e Bao and more of its affiliates have put in place is like an Amazon,

Facebook, Netflix, PayPal and more all in one ecosystem. For example, a vision for Alibaba is that:

- you can advertise movie concepts and ask customers to crowdfund the movie ideas they like, all channelled through Alibaba Pictures;
- once a movie is funded and gets made, you can buy tickets to see the movie through Taobao;
- when you see the movie, you might want to watch the digital release at home on Youku, Alibaba's version of Netflix;
- if you like the movie that much, you can buy branded memorabilia on Tmall;
- all of it is paid for and funded through your Ant Financial accounts.

In other words, it offers a digital marketplace that manages the complete process of digital creation from start to finish. The banking stuff is simply embedded in this ecosystem. This concept is nicely summarised by Jack in his presentation to the Taobao annual partners meeting, nicknamed "Netrepeneurs: Made in Internet", in 2017. I attended this meeting in Hangzhou, and it was an immersive experience. A mixture of online teenage celebrities streaming their ideas to entrepreneurial Taobao businesses talking about their business models and dreams, it was all very Chinese.

The meeting concluded with an interview with Jack, and here are my main notes and takeaways from what he said:

- "It is impossible to do business today offline as everything has to have something online, which is why we need more netrepreneurs. The whole supply chain will be impacted by the internet. I talk about these challenges at many conferences and people don't believe me, but I'm used to this. It's like climbing a mountain. What you see at the foot of the hill is very different to what you see when you're halfway up. What's at the top of the mountain are those who change their mindsets and, in the next three decades, the world will change more than you can ever imagine."

- "In the next 10 years all industries will change due to AI, big data and cloud. Industries will be turned on their head. This means that, in the future, there will be no "made in", as in "Made in China" or "Made in India". You will just have designed, ideated, printed and made it in the internet. Equally, everything can now be customised. It's expensive to customise today but, if you can't do it tomorrow, your company will fail."
- "Alibaba doesn't do e-commerce. We only provide the platform. So, the more success our partners have, the more successful are we."
- "Three years ago, we bet that cloud and big data would be key. Most critical are data and computing. We put all of our resources into data, computing and data services. But still what we do is just a fraction of the total. Soon we will have IoT and all these devices will create data, and this is why we are panicked. There will be a huge amount of data to deal with."
- "In the age of data, we can no longer have this idea of controlling everything. A monopoly is an idea of the industrial era. We just want to help people, not be a monopoly. We want to connect everyone."
- "We provide payments and logistics and shipping. We can deliver anywhere in China within 24 hours. That's too slow for Beijing and Shanghai but, for the villages, we want to build that infrastructure across all China. We will never be a logistics company, however. We partner with others for this. So, we focus on the things that others cannot do or are not willing to do. We focus on things SMEs cannot do. We only want to compete with companies that won't share or partner with others."
- "If you are having a difficult time as a startup, we were like that, but we had a dream and now we have got there. Now we are a huge company, but if we stay there and don't share those riches, then everyone will hate us. So, we have to make everyone richer. If you are the only rich person in a village of paupers, the paupers will kill you."

- "Alibaba is a tool for everyone that should benefit everyone, especially young people. Remember I was a teacher—and any company will diminish ultimately. I want people to say Alibaba is great, not because we sell a lot of product, but because we helped young people and our society."
- "Management. The word is there for regular companies. At Alibaba, we treat it more like governing an economy, as we have to manage so many companies dependent upon us as partners. Any SME with an idea now has a way to realise that idea. Alibaba marketplace can find you buyers and sellers; we can provide you with computing through cloud; we can distribute and deliver your products. By 2036 we will have built an economy that can support 100 million businesses for billions of users. We won't own that economy. We will just govern it."
- "Having great, smart experiences will be the keywords for our next decade."
- "FinTech is there to empower the financial sector. I want to do that for consumers so they have equal access to finance. I don't want people to be waiting for money or for pity. I want to empower them through access and inclusion, and get things to people a lot faster and easier."
- "This year is very different to five years ago. This year we focus upon 'Made in Internet'. Your business model is to redefine your consumers, supply chain and financing methods for the Made in Internet age. I tell all retailers and manufacturers and banks to do this urgently as I've been saying it for over a decade. You don't have so much time left."

Figure 2: Jack Ma at the M@de in Internet Alibaba event in China.

Finally, here are the top 10 messages that Jack gives people for business:

1. On chasing dreams: dream big, really big
2. Remember: the bigger the problem, the greater the opportunity
3. Today is tough, but the day after tomorrow is beautiful
4. Focus on the customer and the rest will follow
5. Learn from competitors, but never copy them
6. It's more important to be best than first
7. Find opportunity in crisis
8. Use your competitors' strength against them
9. Don't dwell on mistakes
10. The team should work for the goal, not for the boss

Driving Alipay's innovation?

When it began, as an escrow system, the exchange of information was based upon fax messaging. Fax messages to and from the bank and seller via Alibaba allowed Taobao orders to be fulfilled. Roll on five years, and that had changed.

In the summer of 2011, China's Alipay developed a QR-code payment system to support payments, and this was the revolution that

turbo-charged a payments transformation in China. This is because China had few credit and debit cards in the hands of the population, but everyone had a mobile phone. At the time using the phone for payments wasn't easy. Then the roll-out of the QR-code system changed all that. Similar to the Starbucks app that had made Starbucks become a payments phenomenon in America, Alipay did the same thing, generating a unique QR-code at checkout that merchants can scan with a barcode reader or their own smartphone camera. The system draws funds from a user's credit card or a prepaid Alipay account.

This move also led to some problems though, as Jack Ma made the controversial decision to spin out Alipay as a separate company, without approval from Yahoo or Softbank, who owned 40 percent and 30 percent of Alibaba at the time. The move needed to be made because the firm could not continue to act as a payments processor without a third-party payments license from the government. This license would not be issued unless Alipay was set up as a dedicated payments processor. The controversy was settled by agreeing that a certain percentage of Alipay's revenues would flow back through Alibaba, but it did cause a bad taste in the investor's mouths.

Singles' Day is just one of several events created to promote the use of mobile payments in China, finding its source in the battle between Alipay and WeChat Pay over the red envelope day to celebrate Chinese New Year.

The idea began in 2014 when Tencent promoted its 400 million WeChat users to send each other virtual red envelopes, which would be deposited into their mobile payment accounts. The gimmick became a big hit with 40 million virtual envelopes being exchanged, worth a record 400 million yuan ($64 million). Jack Ma called it a "Pearl Harbor moment" for his company, and ramped up the game in 2015 by announcing it would give away more than 600 million yuan ($96 million) to its 190 million users as "lucky money" gifts if they used its red envelope messaging system. Tencent responded within hours by saying it would also gift 800 million yuan ($125 million) to users of its virtual red envelopes service, and blocked Alipay users from their WeChat friends. Tencent's WeChat won that battle, with over one billion virtual red envelopes sent on 18 February, compared

with 240 million sent through the Alipay Wallet—and, as can be seen, the rivalry between the two firms is intense.

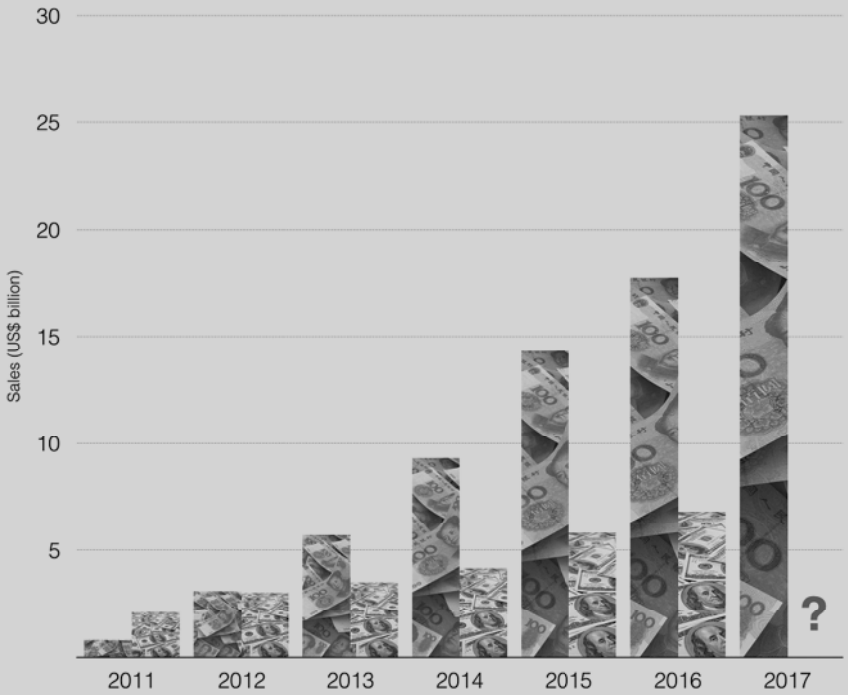

Figure 3: Alipay's Singles' Day is the world's largest single day of commerce. Visa averages 1,750 tps and scales to 24,000 tps; during Singles' Day Alipay beats that handsomely, with transaction volumes exceeding 300,000 tps.

Meanwhile, Alipay extended its tentacles into other areas, such as creating a savings fund for customers to store their balances when not using Alipay. Called Yu'e Bao ("leftover treasure", as mentioned earlier), it acts as a method of moving prepaid funds from a balance on Alipay to an amount that can gain interest on Yu'e Bao. Western media call it a "money market fund", but Ant Financial take exception to this, as they see it as just a way of gaining interest on unused funds—a behavioural savings feature.

Another move occurred in 2014, when China's regulators offered private companies the opportunity to apply for banking licenses, resulting

in Ant Financial launching a bank in 2015 called MyBank. Ant Financial hold a 30 percent stake in MyBank alongside other main shareholders, including Fosun Industrial, Wanxiang Sannong, and Ningbo Jinrun—three Chinese conglomerates with investments in agriculture, insurance, machinery, and other industries. The founders' initial investment is four billion yuan (about $644 million). MyBank's most important partner is Alibaba, however, as the main offering of loans is based upon user's transaction history in Taobao and Tmall.

MyBank focuses upon supporting small businesses on Taobao, which supports over five million merchants. At its launch Eric Jing, MyBank's executive chairman, said that their mission is "answering to the needs of those who have limited access to financial services in China" and "is here to give affordable loans for small and micro enterprises".

A good example of such a service is a Taobao-subscribed shop owner who sells beef jerky. Each time they receive an order, they can immediately turn that order into cash through a short-term MyBank microloan. This particular store owner has had 3,795 such loans in the last five years, an average of two loans a day, with the amounts varying from three yuan (half a dollar) to 56,000 yuan (US$8,000).

The learning Alibaba gained through MyBank enabled the company to open its services to other Chinese banks to use when, in 2013, Alibaba verticalised their cloud with the announcement of Ali Cloud for Financial Services, or the Ali Finance Cloud for short.

The development of the Ali Finance Cloud was part of a perfect storm for Ant Financial. They had applied for their MyBank license and obviously needed to have a future-proofed, core-banking system. Rather than look to an external provider, they decided to develop it internally.

A bank developing its core banking system internally is not unique in China, but Ant Financial went one step further by deciding to sell the cloud-based solution to other banks in China. The breadth of the solution is extensive, including risk management, lending, deposits, mobile apps, infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), know-your-customer (KYC) and more.

It is difficult to overstate the potential impact of Ali Finance Cloud on the Chinese banking industry, or the potential implications globally. Adoption and usage of the Ali Finance Cloud in China has been swift, with around 40 organisations using the service, including banks, payment providers and even peer-to-peer (P2P) platforms.

Ant Financial: Building a better China

One of the big things about Ant Financial is its principles and mission, which is all about using technology to improve society and the economy. Here is the opening statement from their 2016 Sustainability Report.[3]

The evolutionary and civilized history of the human being, in the simplest way, can be seen as a progressive history where a marginal species climbed rapidly to the top of the ecological chain by developing cognition, agriculture, industry, science and technology. At present, human beings are in a golden age of the so-called third industrial revolution.

As a tech company, what we want to do and are currently doing is to use technology to bring society back to the origin of human beings: simple, equal and free. For example, our daily errands, can we handle them easily without queuing, begging people or even going out? This is the simple principle. Can a grandmother and a bank president enjoy the same quality and equally convenient financial services? This is the equal principle. Can we say goodbye to complicated passwords, cash or even ID cards and passports, paying bills easily with a face and the credit data behind it?

Technology is at the heart of this vision and, more importantly, it is at the heart of this business. For example, the company states openly that creditworthiness is the passport to a better society. Creditworthiness has been difficult historically, as you need some form of credit history to evaluate people; without data, that is hard.

This is all changed today, thanks to the development of cloud computing, machine learning and big data. Creditworthiness, which used to be regarded as a moral evaluation, is now becoming direct and quantitative and can be analysed as well as utilised in real time. Ant Financial therefore created a brand new credit evaluation system called

Zhima Credit, which enables more people to enjoy convenience in finance, life and other sectors.

The Zhima Credit score is based on your financial behaviours and trustworthiness with money, and a key part of this is ensuring people pay back. Zhima Credit scoring works with the support of intelligent decision-making, and this is a core part of Ant Financial's operations based upon a well-established creditworthiness evaluation and risk forecasting system that operates in real time. As a result, farmers without bank statements can obtain loans to buy fertiliser and seeds through MyBank.

Ant Financial illustrates this through the stories of their partners.

A key backdrop to the Zhima Credit score, creditworthiness, microloans and inclusiveness is Ant Financial's continual real-time analytics and risk management. This enables the company to deliver its "3, 1, 0 strategy": it takes *three minutes* to apply for a loan; *one second* to transfer the funds to the applicant's account; and there is *zero manual intervention* in the whole process.

MyBank has helped many blue-collar workers, undergraduate students and migrant workers to embark on a new life. By the end of April 2017, 6.5 million people had borrowed over 800 billion yuan (US$125 billion) in just two years.

This is bringing a convergence between creditworthiness and wealth to help people from all walks of life to realise their dreams. Creditworthiness is linked not only to wealth, but also to the operation and governance of society. It is closely related to everyone's daily life. This is why the usage of technology to extend credit to everyone creates a more inclusive economy and a more equal society.

Ant Financial believe that, in the near future, it is likely that cameras in restaurants, subways and airports will automatically identify your credit status. People will be able to go out without a mobile phone, cash or even an identity card. They can go anywhere using only their face as their authentication system. From your face the cloud, and the big data of creditworthiness behind it, will become everyone's passport in society. The trustworthy will be welcomed everywhere, while the untrustworthy will be rebuffed at every step.

That is why creditworthiness is a critical factor driving Ant Financial, Chinese society and the economy forward, with the company regularly acting as a mediator between those who can be trusted and those who cannot. It is why Ant Financial's Zhima Credit system is working with China's Supreme People's Court to punish dishonest credit behaviours. By January 2017, Zhima Credit had assisted the Supreme People's Court to punish over 730,000 dishonest debtors, almost 50,000 of whom have paid off their debt. This is another key tenet of Ant Financial's vision, in using creditworthiness to improve social governance and make integrity a highly valued attribute of society.

People born in the 1990s have grown up in an environment where the concepts and applications of creditworthiness are being popularised. For example, one in four Chinese people born since 1990 use Ant Credit Pay for consumption. Therefore, they have a clearer understanding of creditworthiness, and value it more than the older generations. Statistics on Ant Credit Pay show that the proportion of people born in the 1990s who repay their debt on time is 99 percent. A society that values and upholds integrity is taking shape.

When I attended the Alibaba partners conference in July 2017, they hosted many of their most successful Taobao businesses in Hangzhou, China. Many of these are young people who are now entrepreneurs. Intriguingly some of these businesses are based in rural villages—because they can be. This is a massive change in society in China and, from a digital age platform, the world. The fact is that anyone, anywhere—even in the most remote villages—can become an entrepreneur if they have an internet connection and, increasingly, everyone has this through their mobile smartphone.

But it's not just commerce and society that Ant Financial focuses upon. Equally, it is worth underlining that Ant Financial is not first and foremost a financial firm. They are a technology firm, focused upon leverage technologies to improve society and the economy. This is illustrated well by their services to government.

A final element worth mentioning in Ant Financial's strategy is building a greener planet. This is achieved through their program of gamification, called "Ant Forest".

The idea of Ant Forest originates from the carbon emissions account of Alipay, which is by far the largest platform for personal carbon accounts in the world. In the Alipay carbon account, users are educated in using some of the common global practices in energy conservation and emission reduction. It is the first carbon account using a bottom-up approach to reduce carbon emissions. Specifically, Ant Forest encourages users to choose greener lifestyles by taking public transport, paying utility bills digitally and booking tickets online. It is also the first in the world that encourages hundreds of millions of people to lead a low-carbon life voluntarily, rather than forcing this approach top-down.

Embedded banking: understanding not selling

Ant Financial is the only company worldwide today focused upon building a global financial inclusion platform. A platform that can support and connect potentially seven-and-a-half billion people in real time. At the very least, a platform that will include all those who are currently excluded from the financial network, by offering them a connection via the mobile network and simple technologies that are interoperable between operators in all countries.

Their strategy is based upon finding companies in other countries who offer an e-wallet payments service, and then to invest in those firms and share their technologies with them. Eventually, it is likely that Alipay and Ant Financial's base technologies would be powering the core infrastructure of e-wallets globally—a sort of globally aggregated wallet service.

First, they invest in equivalent products and services in similar markets, such as India and Thailand. That is why Ant Financial's leadership team talks about inclusiveness, as that's a great strategy with a mobile wallet. Hence, they invested $680 million in India's Paytm in September 2015, just before demonetisation stimulated Indians to open 200 million wallets

on Paytm. In November 2016, Ant partnered with Thailand's Ascend Money, which also runs a digital wallet service. Under the agreement, Ant Financial will assist Ascend Money to grow its online and offline payments and financial services ecosystem. It is notable that Ascend may be based in Thailand, but also operates in Indonesia, the Philippines, Vietnam, Myanmar and Cambodia.

In February 2017, they announced a $3 billion debt financing deal to expand their investment portfolio and, interestingly, moved into the US market with a bid to acquire MoneyGram for $880 million. This was followed by a strategic investment in the Korean messaging service Kakao, which offers Kakao Pay; also, in March 2017, they increased their stake in Paytm, so that Ant Financial is now the majority owner of the service.

Meantime, apart from heading for inclusiveness, Ant Financial has also expanded into the USA and Europe. At the end of 2015, the company signed a deal with Wirecard to give them access to Europe for merchant checkout using their wallet for Chinese tourists. This was followed with a partnership with Ingenico to further enhance their European presence and then a deal with First Data to give them a similar coverage of North America.

The media positions the Wirecard, Ingenico and First Data moves as being a pure provision of service for Chinese tourists, but it is not as simple as this. This is a fast-moving company that is expanding non-stop in its mission to be the dominant global mobile wallet.

That is the mission and was articulated by Ant Financial CEO Eric Jing at Davos in January 2017, where he stated: "We have an ambition to be a global company. My vision [is] that we want to serve two billion people in the next 10 years by using technology, by working together with partners...to serve those underserved."

How Ant Financial thinks is radically different to US and European FinTech firms, because it is automating a market that had nothing before. When Alipay began, there was no e-commerce in China. Alibaba and Alipay created it.

That's a radical difference from the American internet giants like Amazon and eBay, who had major bricks-and-mortar competitors also competing

online, and began without any payments integration. Equally, the US giants were serving a developed market, where consumers had sophisticated online needs; Alibaba and Alipay were serving markets that were changing dynamically as Chinese citizens moved from rural, agricultural work to the rapidly expanding cities, where manufacturing offered a rapid uplift from poverty to riches. In fact, Amazon runs a 14-year-old ACH payments system today, showing one of the core differences between Alibaba and the US commerce giant.

In creating this revolution of commerce in China, both manufacturing and online, Ant has emerged as the leader, and they talk about empowering digital FinLife globally. This is important, since it's not a payments app or a mobile wallet, but a complete social, commercial and financial systems in one. Imagine Facebook, Amazon and PayPal all integrated into one app. That's what Ant has got.

And their business model is fundamentally based upon deep user understanding, not cross-selling.

This is an abbreviated version of a detailed case study of Ant Financial in Chris Skinner's new book, Digital Human. *The full version includes five interviews covering the past, present and future of Ant Financial, from the person who wrote the first code to the head of strategy building the company's future.*

Endnotes

1 See https://www.finextra.com/resources/feature.aspx?featureid=845.

2 Read more in Chris' latest book *Digital Human.*

3 Many of the facts and statements made in this section draw on Ant Financial's 2016 Sustainability Report—https://os.alipayobjects.com/rmsportal/omkAQCxPyHDDqtqBDnlh.pdf.