Hype Cycle for Digital Banking Transformation, 2019

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Globally, many banks are making progress toward becoming true digital businesses. However, too many will fail to deliver success, and bank CIOs and their contemporaries must fully embrace the opportunities to totally transform both their business ecosystems and the underlying business models.

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What You Need to Know

This document was revised on 5 September 2019. The document you are viewing is the corrected version. For more information, see the Corrections page on gartner.com.

This Hype Cycle exists in the context of global banking markets that are highly fragmented, with huge disparities in numbers and types of banks embracing digital transformation. Across countries and regions, demand-side drivers from customers vary significantly, as do supply-side capabilities to support banks as agile digital businesses. Equally, Gartner sees transformation accelerating in certain sectors, such as retail banking, with other sectors somewhat lagging. And these disparities persist to the most granular level within individual enterprises themselves, where different views on risk, investment appetite and innovative vision mean that single companies can view emerging technologies in multiple different ways. This Hype Cycle positions innovative technologies and capabilities in that context of fragmentation. When considering time to maturity and potential business impact, it is important that the reader considers local market conditions, regulatory environment and customer demand, as well as variations in enterprise policies, politics and strategies.

The Hype Cycle

This year's Hype Cycle has been subject to significant review and revision to ensure that it remains focused on the varying needs of digital transformation. Bank CIOs need a clear vision for their industry and their institution's role within it. They need clarity on technologies to embrace and develop, as well as those that they should allow to pass by or simply keep as a "watching brief." The focus remains on enabling business transformation — changing core business models and deepening understanding of customers — rather than on the technology for technology's sake.

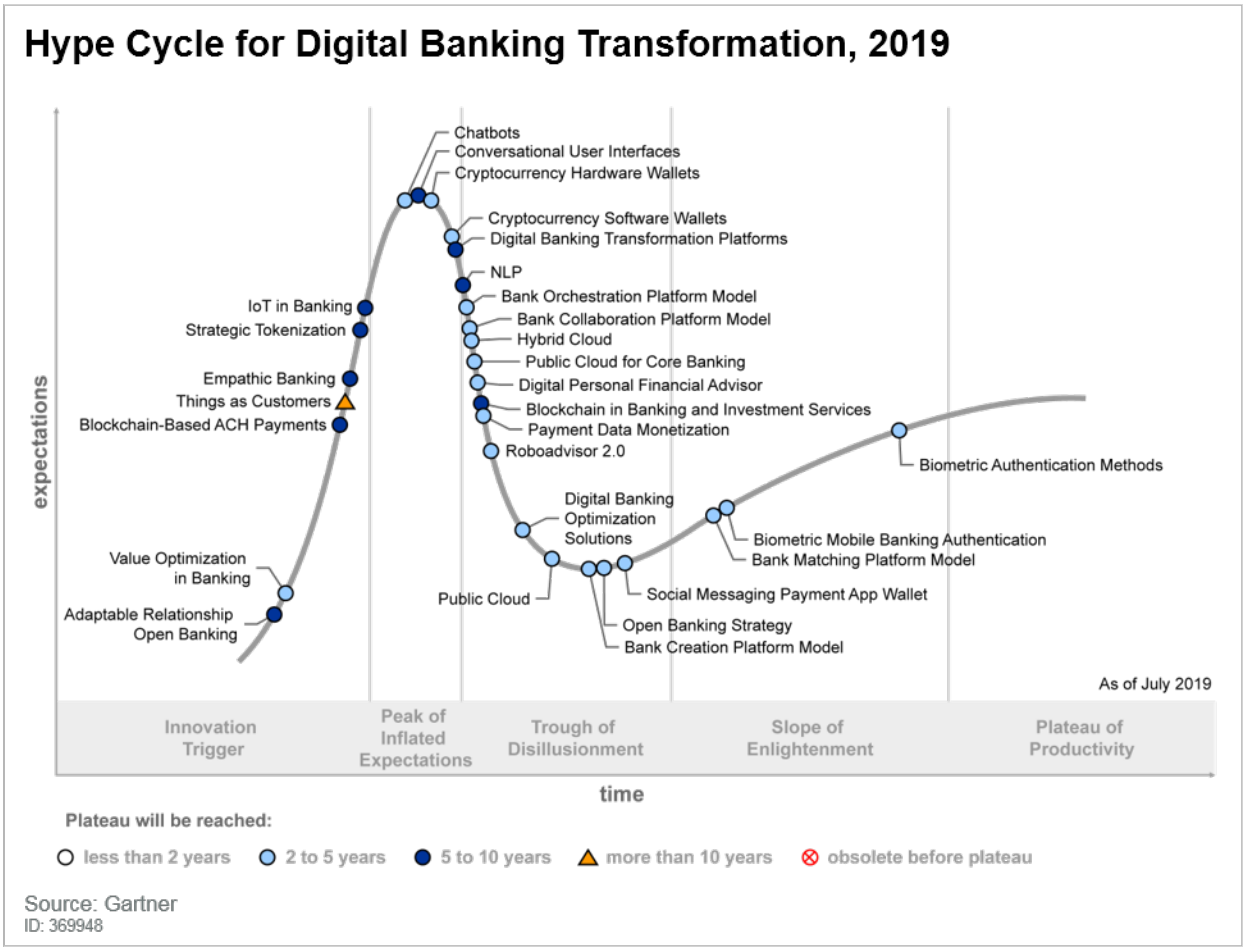
As with previous years, the Hype Cycle does not attempt to cover every technology that impacts banks. Rather, it highlights those technologies that represent inflection points on the digital transformation journey for banks. This Hype Cycle should be viewed in conjunction with others — specifically the "Hype Cycle for Open Banking, 2019," the "Hype Cycle for Blockchain Technologies, 2019" and the "Hype Cycle for Artificial Intelligence, 2019."

The broader market challenges of 2017 and 2018 have persisted and strengthened into 2019. Customers demand more from providers at every level. New nonbank fintech competitors, especially the platform-focused, ecosystem-centric digital dragons, have continued to set market expectations. Regulators are increasingly key in the innovation journey. Even in markets where they were once considered as conservative, now they play a more-pivotal role as they learn from global contemporaries and expand their thinking in areas like open banking. Threats from cyberattacks are ever-present, but conversely offer banks an opportunity to differentiate themselves in terms of protecting their customers' assets and identities. And of course, the rise of emerging technologies, such as artificial intelligence (AI), the Internet of Things (IoT) and blockchain increase the demand on CIOs to be experts across multiple new domains.

This Hype Cycle reflects these changes by including a number of innovations (see Figure 1):

- Adaptable Relationship Open Banking
- Value Optimization in Banking
- Blockchain-Based ACH Payments
- Empathic Banking
- Chatbots
- Bank Collaboration Platform Model
- Bank Orchestration Platform Model
- Bank Creation Platform Model
- Bank Matching Platform Model

Figure 1. Hype Cycle for Digital Banking Transformation, 2019



Source: Gartner
ID: 369948

The Priority Matrix

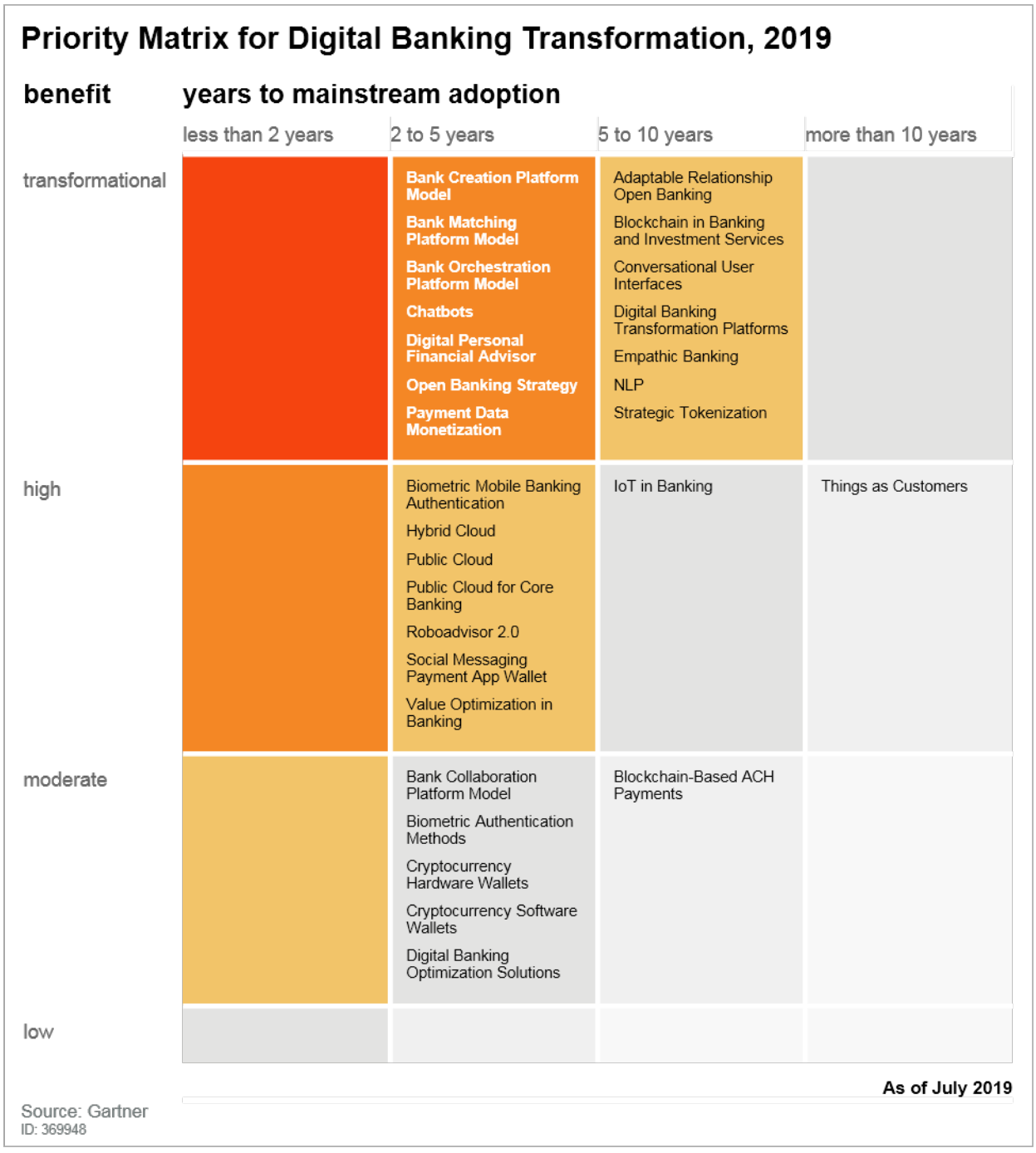
The Priority Matrix offers a different perspective to the traditional Hype Cycle view through segmenting and displaying the technologies according to their transformational impact and their relative times to maturity. This different lens on the technologies provides a dynamic view of the speed at which technologies will hit the industry, as well as the intensity of that impact.

The number of technology innovations defined as being transformational has increased from 10 to 14. Seven of these technologies are considered likely to achieve widespread adoption and maturity within the two- to five-year time span. Specifically, the adoption of open banking and the development of the new platform-based business models that will evolve through this process account for six of these emerging technologies. The others relate to the new role for payment data in future business models in banking —oil for the revenue wheels of banks, and the fuel that will enable them to transform how they engage with customers in the future. Equally, the growth of intelligent digital financial advisors with perfect market knowledge will undermine many existing business models on which banks have relied for years.

Over the five- to 10-year time frame, seven additional technologies are highlighted. Three were new to last year's Hype Cycle — NLP, Conversational User Interfaces and Strategic Tokenization — focusing on the potential for a fundamental resetting of the core principles of banking. Blockchain in Banking and Investment Services remains, albeit renamed, describing the potential for this still immature technology. New technologies include Empathic Banking, Adaptable Relationship Open Banking and Digital Banking Transformation Platforms, all of which foresee an environment where banks use data, insight and context to better address the real-world needs of their customers.

No technologies have been designated as having a high impact within the next two years. However, seven technologies have been designated as having a high impact through the next two to five years, and readers should focus on understanding the real business impact of technologies within these time frames (see Figure 2).

Figure 2. Priority Matrix for Digital Banking Transformation, 2019



Off the Hype Cycle

This year's Hype Cycle has been subject to significant review, to ensure the focus remains on strategically important technologies for those institutions undergoing digital transformation. Consequently, a number of new technologies are now being covered in more detail, but this has

resulted in the need to drop a significant number of technologies from the Hype Cycle. Coverage of some technologies has been moved to other Hype Cycles, some have simply reached obsolescence, while others have been dropped due to a lack of relevance relative to other technologies. In total, 16 technologies that appeared on the "Hype Cycle for Digital Banking Transformation, 2018" have been omitted from this year's Hype Cycle:

- Mobile Imaging for Bank Customers — This technology is now considered mature and has been dropped from the Hype Cycle.
- Mobile Wireless Payment Systems (for Nonmature Payments Markets) — This technology has been dropped due to reduced relevance to the digital transformation agenda.
- Wearable Banking Apps — This technology has been dropped due to reduced relevance to the digital transformation agenda.
- Instant Low-Value Payment Systems — This technology has been dropped due to reduced relevance to the digital transformation agenda.
- Mobile Imaging for Bank Staff — This technology is now considered mature and has been dropped from the Hype Cycle.
- Mobile Originated P2P Payment Solutions (for Mature Payment Markets) — This technology has been dropped due to reduced relevance to the digital transformation agenda.
- Digital Payment Advisor — This technology has been merged with that of Digital Personal Financial Advisor.
- In-Branch and ATM Video — This technology has been dropped due to reduced relevance to the digital transformation agenda.
- BIAN Standards — This technology is now covered in the Hype Cycle for Open Banking.
- Open Bank Systems — This technology has now been integrated into Open Banking Strategy.
- Open Banking — This technology has now been integrated into Open Banking Strategy.
- Blockchain Reward Models — This technology is now covered in the Hype Cycle for Blockchain Business.
- Blockchain Wallet Platform — This technology has been dropped from coverage.
- RegTech — this technology has been considered too broad and generic and dropped from coverage
- Digital Wallet Consumer Hub — this technology has been dropped from coverage
- Geolocation Products and Services — This technology has been dropped due to reduced relevance to the digital transformation agenda.

On the Rise

Adaptable Relationship Open Banking

Analysis By: Stessa Cohen

Definition: Adaptable relationship strategies are an approach that uses the bank's open banking platform to capture, detect and adapt to the multiple financial relationships around customer life events and experiences. Adaptable relationship services are built on data that connects the customer to family members and other personal and commercial relationships and networks to manage the events along the financial life cycle.

Position and Adoption Speed Justification: Bank CIOs must create business cases to leverage the capabilities of the open banking strategy. When they respond more empathically to their customers, they are more able to identify new services that leverage open banking strategy. This ability goes beyond traditional demographic segmentation and marketing. The ability to leverage adaptable relationships via an open banking strategy enables the bank to detect customer needs that may be satisfied through orchestration of existing and new services, processes and transactions that use digital platforms, marketplaces and ecosystems.

However, CIOs who pursue this approach face many significant challenges. These challenges include educating internal bank IT and business staff, marketing these new products and services, and defining new key performance indicators. The CIO and senior business executives will also have to address IT, product and line-of-business silos to achieve the level of collaboration, data sharing and connectivity that such an approach requires. Data privacy regulations will also challenge bank CIOs in creating these services. For this reason, this approach will take longer to mature, though the technology to achieve it may already be available.

User Advice: Work with senior business executives to create business cases for expanding customer relationships that will leverage the capabilities of the open banking strategy. These business cases should be oriented toward creating an empathic relationship with customers, rather than traditional cross-selling or upselling of existing products and services.

Begin using adaptable relationships for open banking by identifying and fixing specific customer problems — such as digitizing the ability to designate a financial power of attorney and enabling the customer to specify capabilities that a designee can perform.

Business Impact: This approach enables CIOs to use open banking to create multiple relationships around life events and experiences that go beyond traditional demographic segmentation and marketing. Using this approach will enable the bank to create many business cases to leverage the open banking strategy, platforms, ecosystems and marketplaces that will drive new business models.

For example, an elderly customer can share her financial power of attorney not only with her bank but also with all of her financial relationships (brokerages, insurance, billers). She can activate financial activities that she wants the person who has the financial power of attorney to be able to do. The adaptable relationship enables the customer to expand and contract this person's role as

dictated by circumstances. The bank becomes the trusted advisor that can suggest additional actions that to be taken, based on the customer's needs, and connect to the relevant platforms to share this information and documentation. The bank also becomes trusted with the customer's privacy.

These new business models will enable the bank to better adapt to customers' real and changing requirements for financial services across the customer's financial life cycle. Bank CIOs who use this approach will be able to transcend the traditional lines of businesses and traditional banking services in retail banking, wealth management, brokerage and likely other LOBs. They can detect and support the changing relationships and service needs as customers move through their financial life cycles. The ability to use the open banking strategy will start with new services for API-driven data aggregation. CIOs can build these types of services only with the bank's increased use of transparent trusted services.

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Recommended Reading: "Empathic Banking: CIOs Can Drive New Revenue by Anticipating Customers' Needs"

Value Optimization in Banking

Analysis By: Alistair Newton

Definition: Many enterprises find it difficult to measure or even identify returns on their digital investments. Value optimization highlights new approaches for banks to quantify and measure the nonfinancial value generated by their investments in the digital business arena.

Position and Adoption Speed Justification: This innovation is at the very early stage of development and adoption. Many Gartner clients are struggling to capture the nonfinancial returns generated from their digital investments. They are looking for new ways to articulate the benefits of digital progression to their investors, their executive colleagues and their staff. Value optimization uses nonfinancial metrics and KPIs to help quantify impact and justify ongoing digital investments. Given initial urgency and feedback from clients on this innovation area, progression is expected to be brisk but sustainable, hence the two- to five-year time horizon for maturity.

User Advice: Many enterprises find it difficult to effectively measure or identify returns on their digital investments. Much of the value generated by digital investments in not fully accounted for because it falls outside traditional financial accounting or operational measures. And CIOs need a means to invest effectively to support their enterprise digital business strategies and to show that value is being generated by those investments. So bank CIOs need to emulate approaches taken by other nonbank digital businesses and look differently at the way in which they quantify value.

To this end, Gartner has highlighted the four forms in which value is generated from digital investments.

- Financial — cost saving or revenue generation
- Utility or Goal — deliver a specific utility or target
- Experiential — impact customer or staff experience
- Knowledge and insight — increase understanding of customer needs and context

Bank CIOs should start to capture the nonmonetary value being generated from your enterprise digital investments by publishing their own series of nontraditional metrics and KPIs. These should quantify the value generated by specific digital investments. They need to start slowly by focusing on a selective number of projects or investment areas. Then align the metrics tightly to the impact on cultural maturity, talent management and resource allocation. They should also consider a soft launch for such metrics by collecting the relevant data in parallel to existing official measures, and retrospectively assessing the variations. Where their CFO is open to innovation, bank CIOs may work directly with them, but they should not allow recalcitrant CFOs to hinder progress in this area.

Business Impact: Many enterprises find it difficult to measure or even identify returns on their digital investments. This innovative approach to quantifying and measuring the real value generated by their investments in becoming digital businesses should enable those enterprises to move beyond faith-based investment decisions. Traditional ROI measures and cost-benefit analysis struggle to capture the benefits generated from digital investments. Direct or measurable links to cost savings or revenue opportunities are difficult to establish. However, that doesn't mean that value is not being generated — simply that enterprises and responsible executives are failing to capture that value. CIOs can take the lead in breaking new ground in these areas of value measurement.

Bank CIOs need to think more like CIOs for a true digital business. By focusing on the four areas of value generation, they can help their enterprises to break down barriers that specifically hinder digital transformation, such as **talent management, cultural development and resource allocation.**

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Blockchain-Based ACH Payments

Analysis By: Alistair Newton

Definition: Blockchain-based ACH payment describe payment solutions that use core blockchain technologies to supplement or replace existing domestic bulk payments systems — most commonly known as ACH payments systems, after the Automated Clearing Houses that invariably supply and support these domestic payment systems.

Position and Adoption Speed Justification: As with last year, this technology is positioned at a very early stage on the Hype Cycle, reflecting the fact that the base blockchain and distributed ledger technologies remain very immature. While many domestic ACH systems are currently up for review and renewal, Gartner still considers it unlikely that blockchain solutions will play a significant part in their immediate replacement. Given the systemic importance of these key payment systems, it is not considered likely that their replacement by solutions based on such immature technology will occur within at least the next five years. While blockchain technology has the potential to transform businesses and certain aspects of banking, that potential remains limited in the payments arena to some opportunities in the cross-border remittance market. Gartner believes that businesses considering deployment of blockchain technologies in the domestic payments market (specifically those focusing on the bulk ACH payments space) ought to wait a considerable period of time. Regulators and others still have obvious concerns over deploying unproven technology in such systemically important infrastructure projects. The vendor landscape focused purely on ACH payments is sparse. Equally, the business value such a rollout could deliver is likely negative in the short term to medium term.

User Advice: Bank CIOs and digital business leads:

- Accelerate your institutional knowledge of blockchain capabilities by including the technology in proofs of concept for new, low-risk services.
- If your local bulk payment system is due for replacement within the next five years, monitor and challenge overzealous calls for it to be based on blockchain technology. Instead, aim for an implementation that will ultimately allow integration with the wider blockchain ecosystem.
- If you already have access to a modern near-real-time payments infrastructure, undertake additional planning to allow integration with future blockchain deployments in the nonpayments space.

Business Impact: The theoretical benefits to be accrued from a blockchain-based bulk payment system may be high. However, in reality, replacing an existing near-real-time payment solution with a blockchain-based one will deliver little intrinsic benefit. Notwithstanding that many of these modern near-real-time payment systems are very much fit for purpose, they are relatively new and are several years away from being fully amortized. Equally, to leverage the real benefits from blockchain would require many of the end systems and processes that integrate with the bulk payments systems to be re-engineered and rewritten, which is an unlikely occurrence, at least in the short term.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Recommended Reading: “Blockchain Will Prove to Be a Risky Route for Payment Systems”

“Why Retail Payment Systems Don’t Need Blockchain”

Things as Customers

Analysis By: Don Scheibenreif; Mark Raskino

Definition: As internet-connected things become more intelligent, they will increasingly gain the capacity to buy, sell and request service. This will result in new opportunities for revenue, efficiencies and managing customer relationships. Things with these abilities are considered "machine" customers and represent agents for human customers that organizations will be able to sell to and governments can tax. Some things as customers have already been enabled by humans to have the ability to negotiate, buy and sell.

Position and Adoption Speed Justification: Internet-connected things are becoming more intelligent. We already see that some of these things are being connected to intelligent systems powered by artificial intelligence (AI) that learn based on previous experiences and new data and context. Things as customers start simply by alerting human counterparts that they need attention. However, things will advance beyond the role of simple informers to advisors and, ultimately, decision makers. By 2027, Gartner estimates that 50% of people in advanced economies will have AI personal assistants working for them every day. By 2030, Gartner estimates that a billion service tickets will be raised automatically by customer-owned bot. In the shorter term, Gartner predicts that by 2020, 5% of digital commerce transactions will come from smart things. Over time, trillions of dollars will be in the hands of nonhuman customers.

While, today, most things simply inform or make simple recommendations, we do see some examples of things as more complex customers emerging, such as smart grid technologies. This is where, if a thing needs to communicate more data, it can negotiate (maybe wait its turn) for more bandwidth to communicate that data. HP Inc. embraced this future when it created "Instant Ink" — a service that already enables connected printers to automatically order their own ink when supplies run low. Some Tesla cars already order their own spare parts, and Walmart has patented grocery autoreordering based in home IoT sensing. In B2B, U.S.-based industrial supply company Fastenal uses smart vending machines that proactively place orders when stocks run low. Thinking forward, an autonomous vehicle could determine what parking garage to take its human passengers to based on criteria such as distance from destination, price, online review score, parking space dimensions, valet options, etc. In this case, it is the parking garage marketing to the car, not the humans.

However, there are major barriers — the first being trust. Can the human customer trust the technology to accurately predict and execute? And, can the human trust the organization that offers the service? Other barriers include: complex technologies, security and risk/regulatory compliance issues, such as anti-money-laundering (AML) and know your customer (KYC) in the financial services industry. Corruption in the value chains of industries like pharmaceuticals and energy, and patient data privacy in the healthcare industry are also barriers. All this will mean that things as customers across industries will not reach the Plateau of Productivity for five to 10 years.

User Advice:

- Rethink your idea of customers to include machines. Use business scenarios and persona-based analysis to rethink the notion of what a customer is, and determine whether the enterprise has the right capabilities, processes, and systems to identify, serve, communicate,

and take orders from machines as customers. All business functions will change when things become customers.

- Run basic simulations to understand how your organization could cope with the increased load of requests from thing customers.
- Create scenarios to explore the market opportunities. Initiate collaboration with your chief digital officer, chief strategy officer, sales leaders, chief customer officers and others to explore the business potential of machines as your customers.
- Be mindful of the very real barriers. The complexity involved in developing a thing customer that can learn the depth and breadth of knowledge and preference trade-offs required to act on behalf of a human customer in a variety of situations is complex. Some humans may initially be uneasy about delegating purchasing functions to machines. Consider what ethical standards, legal issues and risk mitigation are needed to operate in a world of machines as customers.
- Create a "tiger team" of architects, engineers, data scientists, economists, linguists, psychologists, and business decision makers that will determine assessment requirements, profiles, recommendations and action plans for engaging machines as customers.

Business Impact: Digital-savvy business leaders seeking new growth horizons will need to reimagine both their operating models and business models to take advantage of this ultimate emerging market, whose numbers will dwarf the number of human customers on (and one day perhaps off) the planet. How do you sell to a thing? What will get a thing to buy from you when its decisions are based on algorithms, not emotion? How will your human customer service agents handle requests from millions of things? What does "customer experience" even mean for a thing? Things as customers have the potential to generate new revenue opportunities, improve productivity, increase operational efficiency, improve health/well-being and enhance security of physical assets and people. They will also result in new sources of competition, fraud, legal and taxation challenges, and operational challenges (like how to provide customer service for things).

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Amazon; Caterpillar; Google

Recommended Reading: "Digital Disruption Profile: Things as Customers"

"Prepare Your Business to Engage, Interact, Serve and Listen to 'Things' as a New Customer Segment"

"The Internet of Things Will Improve the Customer Experience"

"The Future of Customer Self-Service: The Digital Future Will Stall Without Customer-Led Automation"

Empathic Banking

Analysis By: Stessa Cohen

Definition: Empathic banking uses digital technology to identify important moments in customers' lives and trigger actions to support them. Empathic banking leverages the capabilities supported by an open banking strategy. Digital banking platforms fundamental for the detection of customer needs and the orchestration of customer interactions that drive new revenue.

Position and Adoption Speed Justification: Bank CIOs can use empathic banking as part of their digital transform strategy and change the way the banks do business with customers. Instead of pushing out transactions for specific needs (for example, transfer funds or cash report), empathic banking requires bank CIOs to establish the means to listen to customer behavior to detect needs and requirements and combine that data with external data to uncover new needs.

Empathic banking requires a digital business ecosystem that will both provide external sources of data and analytics as well as potential partners for orchestrating new services. An open architecture that brings together a presentation layer, and the orchestration of processes, transactions, rules, data and analytics. The open architecture leverages the bank's business ecosystem, supporting an API gateway to govern and manage connectivity to bank systems and external partners (including fintechs), systems and data sources. Enterprisewide deployment of a digital banking platform across the entire bank will facilitate empathic banking. To detect customer needs and orchestrate services that cross lines of business, the bank must have a platform in place that can support this detection and orchestration. Many banks are still in the process of optimizing their banking operations and are not yet ready to move to a digital banking transformation strategy. Many other banks that have a digital banking transformation strategy are in the process of identifying, selecting and deploying digital platforms. The first goals of these deployments are to support existing banking services. At the same time, many banks are faced with Open Banking and data privacy regulations. Both challenges will propel and slow down empathic banking at the same time. Compliance with regulations and the need to create and deploy an open banking strategy could slow down a bank. However, both compliance and Open Banking will facilitate the connectivity, analytics and engagement required to be empathic. Many banks have platforms that are not public. The data sharing required to achieve empathic banking will require CIOs to articulate data usage and privacy capabilities to both internal staff and customers. Other initiatives to change bank organizational culture, support innovation and introduce agile development methodologies must also be underway to support transformative strategies like empathic banking. As a result, Gartner believes this strategy will mature slowly.

User Advice: Create a digitally empathic relationship with customers by developing an understanding of them across all channels, touchpoints and devices and using a digital banking transformation platform.

Create business-moment-driven roadmaps for empathic digital products and services that leverage data, and drive revenue by recognizing and addressing customer-specific needs.

Drive deeper empathic engagement by creating new services that offer proactive advice based on customer-specific analytics. Examples include nontraditional products and services, such as safe storage for valuable digital assets.

Business Impact: Empathic banking has the potential to transform the bank's engagement and interaction with customers. Most banks' digital banking initiatives have focused on optimizing digital channels to improve customer experience and increase customer profitability. Many banks have, perhaps unknowingly, moved toward empathic banking by offering financial management analysis. For example, many banks can advise customers whether they have enough funds to pay monthly bills.

To pursue empathic banking, CIOs must be able to analyze customer aggregate and third party in new ways to identify customer needs. To do this, customers must trust the bank to use their data with care. Therefore, CIOs must build in trustworthiness across all customers and devices. The 2018 Gartner Digital Consumer Perceptions Survey shows that U.S. and U.K. consumers rate banks' digital services as the most trustworthy across all industries surveyed. This trustworthiness is true for consumers in both the U.S. and U.K. and in all age groups. In fact, the oldest consumers who use digital services are the ones who most trust those services and the information they get from them. CIOs can leverage this trust to drive deeper empathic engagement. Therefore, bank CIOs must be able to integrate a digital banking transformation platform with core and traditional CRM systems and data analytics, bring in third-party data to identify business moments that trigger additional actions on behalf of the customer. Banks can also leverage regulations around transparency (PSD2) and data privacy (GDPR) to build trust.

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Apiture; Appway; ieDigital; Leveris; nCino; Technisys; Ubanquity

Recommended Reading: "Leverage Trustworthiness to Start Building Empathic Services in Banking"

"Empathic Banking: CIOs Can Drive New Revenue by Anticipating Customers' Needs"

Strategic Tokenization

Analysis By: Christophe Uzureau; Ali Merji

Definition: Strategic tokenization refers to the design of roadmaps to manage the issuance, acceptance and management of multiple types of tokens in order to support the creation and exchange of value to create or expand a digital ecosystem. A token is a representation of value such as an asset (monetary value or data), identity, as well as an output of the contractual agreements defined by the underlying company/institution, industry or protocol during the creation of the token — the tokenization process.

Position and Adoption Speed Justification: Strategic tokenization considers the roles of tokens across three main categories, all driving digital transformation:

- Value Maximization — The main purpose of the token is to support a specific and predefined process, improving such processes and/or facilitating value exchanges such as JPM Coin.
- Value Representation — This usually refers to the digital/virtual currency domain. The token could be considered as "money" under some conditions (qualifies as a medium of exchange, a store of value and a unit of account). It could also include tokens representing an alternative funding model such as ICO's to STO's, such as with MovieCoin, or an asset-backed or algorithm-based token such as stablecoins.
- Value Creation — The main purpose of the token is to unleash new value by improving the level of autonomy of ecosystem agents (people, machines and organizations) and therefore supporting the programmable economy such as for example with Fetch.AI.

The objectives of strategic tokenization are to enable:

- Data monetization by facilitating the collection, tracking and exchange of data. This includes data generated by the activity of the IoT such as for example with IOTA Foundation.
- The programmable economy that depends on autonomous organizations exchanging data and value while being able to identify the credentials of their counterparts. Supporting smart contracts would also contribute to this objective.
- The modernization of monetary systems by increasing the velocity of money as well as the performance of the underlying infrastructure. This could include the creation of new digital currencies such as with Bitcoin and Ethereum.

As stressed in 2018, strategic tokenization demands to align a large pool of fragmented technologies (multiple blockchain platforms, integration with existing tokens such as EMVCo and PCI Security Standards Council) supported by a large variety of organizations (banks, vendors, central banks, fintechs, blockchain platforms, etc.). While there is a high degree of fragmentation, tokenization has become more visible during 2018 as companies realize that tokenization was not just about ICOs and creating an alternative money, but also about digital transformation. As a result, we are moving the profile to pre-peak 35%.

User Advice:

- Map your token universe by inventorying the tokens that are in use by your enterprise as well as in your ecosystem.
- Maintain a competitive advantage by tracking how your customers are attempting to use your tokens beyond their initial purpose.
- Experiment with tokens by looking for inefficient ecosystem processes, unused or underutilized assets and smart things acting as proxies for people or businesses.
- Prepare for digital and industry transformation by designing token workflows for newly identified products, services and customer interactions, and potentially experimenting with token creation in limited scope proofs of concept.

Business Impact: Tokenization no longer belongs to the tactical domain. Blockchain technology, as well as digital commerce ecosystems, has turned tokenization into a fundamental "invisible"

innovation. Strategic tokenization is therefore at the core of the battles to control the gates of digital ecosystems. As a result, we rate the business impact as transformational — from the perspective of delivering new business models as well as the ability for the organizations in control of tokenization to disrupt multiple industries and generate significant revenue.

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Edgecoin; EMVCo; Ethereum; Fetch.AI; IOTA Foundation (Tangle)

Recommended Reading: "Use Gartner's Strategic Tokenization Decision Framework to Boost the Value of Digital Business Ecosystems"

"Blockchain Not Ready to Unchain Customer Rewards"

IoT in Banking

Analysis By: Alistair Newton

Definition: The Internet of Things (IoT) enables business value creation by reducing operational costs, better managing risk or developing new revenue streams via digital business models and advancing technologies. The IoT in banking relates to the collection and analysis of data generated from "things" — autonomous machines and sensors — to enhance decision making and risk management and the transformation of banking products and services as IoT becomes more integrated into the financial services demand and supply chains.

Position and Adoption Speed Justification: In the eyes of many in banking, the impact of the IoT on banking will be limited. However, Gartner believes that this perception is incorrect. For banking, the potential of the IoT to reduce costs and drive operational efficiencies is limited. The real transformation will derive from the ability to access machines and sensors that will become the new IoT actors and then act on data generated across the IoT. Access to world-class analytics and AI capabilities will begin to define success for banks and new competitors. The ability to adapt and change business models to leverage the opportunities that the IoT will bring will equally define success. Increasingly banks that "think like data companies rather than banks" will be ahead of the pack when it comes to IoT transformation.

Gartner recognizes that the impact of the IoT will take at least five years to truly drive business model transformation in banking. However, the impact of the IoT will lead to significant changes in demand and supply models across a range of retail and corporate banking areas, reshaping customer relationships as it does.

User Advice: Bank CIOs need to prepare their organizations for a series of fundamental shocks and ensure that sufficient scenario planning has been put in place to ensure that each area of the business has identified the impact of the IoT on both the demand and supply aspects of their

business. As data streams from IoT-connected machines, sensors and devices, so institutions that are able to interpret, analyze and act on that data will become dominant in specific market sectors.

Within the context of a developing IoT, the machines, sensors and actors that participate will operate in increasingly autonomous networks and ecosystems, where "ownership" of the network or ecosystem will become something of a meaningless construct. Banks, with their CIOs leading the way through their knowledge and entrepreneurship, need to extend their reach into these developing ecosystems and build new business models based on these flows of data, rather than looking solely for opportunities devolving from IoT usage in other industries.

Business Impact: For banks, the impact of the IoT offers the potential for dramatic business model transformation as new flows of data and new modes of interpreting and analyzing that data drive significant changes in demand for financial services and enable new product and service propositions to evolve to match customer needs. The IoT in banking will drive changes in significant areas of banking, such as:

- New pricing and risk-based models for corporate lending markets
- The restructuring of retail lending markets
- The reclassification of supply chain finance models
- The emergence of autonomous machines and devices as investable assets
- The emergence of autonomous machines as bank customers
- The growth in intelligence-led investing models
- Development of new micropayment capabilities

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Recommended Reading: "Internet of Things Primer for 2018"

"The IoT and Banking: Transforming Digital Business Models and Customer Demand"

At the Peak

Chatbots

Analysis By: Magnus Revang; Anthony Mullen; Brian Manusama

Definition: A chatbot is a domain-specific conversational interface that uses an app, messaging platform, social network or chat solution for its conversations. Chatbots vary in sophistication, from simple, decision-tree-based marketing stunts, to implementations built on feature-rich platforms. They are always narrow in scope. A chatbot can be text- or voice-based, or a combination of both.

Position and Adoption Speed Justification: Chatbots are the No. 1 use of artificial intelligence (AI) in the enterprise. There is a great variation of use cases, such as customer service, human resources, IT help desk, self-service, scheduling, enterprise software front ends, employee productivity, and advisory. There is also a great variation of offerings in the market, such as developer self-service platforms, managed products, middleware offerings, integrated offerings and best-of-breed approaches.

Chatbots in social media, service desk, HR or commerce, as enterprise software front ends, and for self-service, are all growing rapidly. Still, the vast majority of chatbots are simple, relying on scripted responses in a decision tree and relatively few intents. Related to chatbots are virtual agents, which are broader in scope and sophistication, require more infrastructure and staffing to maintain, and are designed for an extended relationship with its users outside of single interactions. Users will interact with hundreds of chatbots, but few virtual agents.

Gartner estimates that there are over 1,000 vendors delivering offerings in the chatbot market. The market is unique in that there is a lot of movement between vendors. Capabilities, sophistication, offerings, go-to-market strategies, pricing models, engagement models, use cases and focus all vary greatly among vendors. The dependency on natural language understanding (NLU), and the difference in performance of NLU across different languages, means that chatbot market maturity varies greatly across geographies and languages.

User Advice:

- Start proof of concept (POC) for chatbots today, because most enterprises experience trouble scaling from the initial POC to production. The focus should be on uncovering the hindrances that will stand in your way.
- Treat vendors as tactical, not strategic — acknowledge that you'll most likely want to switch vendors 12 to 24 months from now.
- Focus on vendors offering platforms that can support multiple chatbots.

Business Impact: Chatbots are the face of artificial intelligence and will impact all areas where there is communication between humans today. Customer service is a huge area in which chatbots are already impacting. Indeed, it will have a great impact on the number of service agents employed by an enterprise, and how customer service itself is conducted. For chatbots as application interfaces, the change from "the user learns the interface" to "the chatbot is learning what the user wants" has great implications for onboarding, training, productivity and efficiency inside the workplace. To summarize, chatbots will have a transformational impact on how we interact with technology.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Amazon; Cognigy; Google; IBM; Microsoft; NTT DOCOMO; Oracle; Rulai

Recommended Reading: "Architecture of Conversational Platforms"

"Market Guide for Conversational Platforms"

"Market Guide for Virtual Customer Assistants"

Conversational User Interfaces

Analysis By: Magnus Revang; Van Baker

Definition: Conversational user interface (CUI) is a high-level design model in which the user and machine interactions primarily occur in the user's spoken or written natural language. Sophistication of the CUI can vary from understanding just simple verbal utterances to handling complex multiturn interactions.

Position and Adoption Speed Justification: CUIs can exist as a front end to application or business process, but also as a description of the interface employed by chatbots and virtual assistants. It's being popularized through products like the Amazon Echo that uses the Amazon Alexa Virtual Personal Assistant (VPA) and Google Home that uses Google Assistant VPA. Enterprises are coming on board, with chatbots being the No. 1 use case for AI technology in enterprises.

The promise of CUIs is a shift in responsibility between the user and the interface. In traditional user interfaces (UIs), the user is an operator of the technology and is largely responsible for the effects of using the technology. In a CUI, this responsibility shifts as the CUI is responsible for taking the user input and determining the intention of the user. Conceptually, the CUI has taken over some of the responsibility that was once reserved for the user. This makes CUIs the first widespread adoption of agent user interfaces.

CUIs will evolve their conversational capabilities through advances in natural language understanding (NLU) and in more advance dialogue management. Additionally, we will see the introduction of multimodal interactions, where speech, text, video and point-and-click interactions are all part of the input used to determine the intention of the user.

User Advice: The conceptual shift away from the user as the operator toward the user as conversing with an agent that will execute on a determined intention — has greater impact on the enterprise than most realize. Training, onboarding, escalations, productivity, empowerment and responsibility all change with this new model and need to be embraced as part of CUI projects. Treat CUIs as transformative and plan on it, and by evolution AUIs becoming the dominant interaction model in the future.

Underlying technology supporting CUIs, either front ends delivered as part of software or custom developed CUIs like chatbots and virtual agents built on top of conversational platforms, will greatly improve over the coming 12 to 24 months. Plan on any adoption to be tactical, with vendor selection changing at that point.

Prepare for CUIs to communicate with each other. Larger architectures connecting different use cases for CUIs, like virtual agents for customer service, human resources, IT help desk to front ends

for enterprise software, business intelligence tools and similar, will be a central challenge for organizations in the next three to five years. This will lead to a variety of architectural models like CUI-to-CUI communication and specialist tooling entering the market.

Prepare for new roles in the enterprise. Dialogue designer, AI trainer, digital coach, humanizer and AI interaction designer are all titles Gartner is seeing in the market to support the creation of conversational experiences.

Business Impact: CUIs are the interaction pattern of many chatbots and virtual assistants — both will be significant contributors to the impact of CUIs, especially in high-touch communicative fields of customer service and Q&A-type interactions with significant volume.

Outside of this, CUIs will appear primarily in new applications. Enterprise IT leaders should be on the lookout for (and biased toward) CUIs to improve employee (and customer) effectiveness, as well as to cut operating expenses and time spent learning arcane computer semantics.

There will also be some retrofitting. Over the next three to five years, we do not expect large enterprises to invest heavily in retrofitting existing systems of record where the employee base is experienced and stable, and the feature set is well-known to the user base. However, where there is high employee turnover or significant rapid changes in feature sets, or where enterprises face a continuing burden of providing computer literacy training, IT leaders need to consider creating people-literate front ends to make it easier for employees to adapt and excel.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Amazon; Baidu; Facebook; Google; IBM; IPsoft; Microsoft; Oracle; Salesforce; SAP

Recommended Reading: “Architecture of Conversational Platforms”

“Market Insight: How to Collaborate and Compete in the Emerging VPA, VCA, VEA and Chatbot Ecosystems”

Cryptocurrency Hardware Wallets

Analysis By: Christophe Uzureau

Definition: A cryptocurrency hardware wallet stores essential information (such as private keys) needed by a user to access and conduct transactions using cryptocurrency (such as Bitcoin or Ether). The hardware wallet is a physical client-side system, as opposed to a software server-side digital wallet, in which users trust a third-party system to keep the user’s identity and record of value.

Position and Adoption Speed Justification: This profile excludes paper wallets (private keys are printed from an offline computer), since they don't provide functionality associated with the concept of a digital wallet.

Cryptocurrency hardware wallets provide a measure of comfort to users concerned about safeguarding their cryptocurrency assets since third-party systems are perceived to not be as secure or reliable as a physical object that is in the user's possession.

The hardware wallet keeps the information in an electronic chip that is protected against tampering or unauthorized access. Hardware wallets may connect to a personal computer, but are isolated from viruses and malware that may be present on the user's computer. Often, the hardware wallet is not stand-alone, but works in conjunction with a server or cloud-based service that provides some capability for data recovery, as well as additional information to conduct transactions. This is both a positive (it provides a means for data recovery and for management and reporting) and a negative (it introduces a dependency on a third-party or remote system, which might not be trustworthy or fully secure).

Despite the decline in value of cryptocurrencies experienced in 2018, the capabilities of hardware wallets continue to evolve through 2019 with new providers entering the market. New capabilities include the new release of Bitcoin Core, allowing to connect full Bitcoin node to hardware wallets providing added security.

As a result, this profile is making progress to the peak. This also recognizes that there is still a significant amount of hype in their potential. They are still reserved for more advanced cryptocurrency enthusiasts and active traders.

User Advice: Consider hardware wallets as a hybrid approach (partly offline, partly online) that provide a mix of convenience and security.

Explore cryptocurrency hardware wallet providers that can supply specific security modules that could be integrated into your blockchain use cases.

Pay special attention to the governance model for such wallets, notably in terms of the specifics of device management terms and conditions.

Business Impact: Hardware wallets address a genuine need of one segment of the market — the segment that is concerned about the security and integrity of its information (and by extension, its assets of value held in cryptocurrency). However, at the moment, the majority of the population is either unaware of security concerns, not willing to take the extra steps for maximum protection, or finds this technology unfamiliar and unproven. For hardware wallets to gain wider adoption, these conditions must change. It is possible that these devices will become an essential part of a broad scope offering, coupled with new functionality that will drive usage (such as supporting smart contracts), and by providing more advanced wallets to enterprise customers.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: KeepKey; Ledger; Trezor

Recommended Reading: "Use Gartner's Strategic Tokenization Decision Framework to Boost the Value of Digital Business Ecosystems"

"Blockchain Not Ready to Unchain Customer Rewards"

Cryptocurrency Software Wallets

Analysis By: Christophe Uzureau

Definition: Cryptocurrency software wallets store essential information (such as private keys) needed by a user to access and conduct transactions using cryptocurrency such as Bitcoin or Ether. This profile includes software server-side digital wallets: wallet apps and online wallets accessed from internet-connected devices, whatever the device. It therefore includes mobile wallets, but excludes hardware wallets (physical devices that store the private keys).

Position and Adoption Speed Justification: The use of cryptocurrency software wallets has so far been mostly related to speculative use cases, often applied to Bitcoin as well as "altcoins." Beyond the complexity of methods they offer to store and secure digital private keys, most cryptocurrency software wallets' capabilities are too narrow to support the requirements of the mass and institutional markets. To gain adoption, cryptocurrency software wallets will need to improve their interface to create, store, exchange and manage related assets, IDs, information as well as interact with smart contracts.

Despite the decline in the value of cryptocurrencies experienced during 2018, new entrants with strong customer reach are entering the market. For example Samsung Electronics provides a cryptocurrency wallet, its "Blockchain Keystore," in its Galaxy S10 mobile device released in 1Q19. However, cryptocurrency software wallets continue to be a weak point in the cryptocurrency trading ecosystem. As a result, while this profile is making progress, it is impacted by related security and functionality limitations. We are therefore moving this profile to the post-Peak 10%.

User Advice:

- Invest in two-factor authentication and explore biometrics to reduce hacking risks, but also to improve security perceptions.
- Cryptocurrency software wallet providers should make sure solutions are well-integrated with existing payment systems and match customer expectations as well as industry standards. For example, issuing a debit card to access the funds makes sense, but you need to ensure customer service is adequate and provide clarity on the fees associated with the service. If not, you will fail to acquire less tech-savvy customers and restrict your target market.

Business Impact: Current business impact is moderate because the use cases associated with cryptocurrency software wallets are limited, mostly to support speculative investment in cryptocurrencies. As distributed ledger technology enables new use cases and cryptocurrencies are

involved in supporting related monetary requirements, cryptocurrency software wallets will gain importance and become more pivotal to the new ecosystems.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Armory; BitGo; Coinomi; Xapo

Recommended Reading: "Use Gartner's Strategic Tokenization Decision Framework to Boost the Value of Digital Business Ecosystems"

"Blockchain Not Ready to Unchain Customer Rewards"

Digital Banking Transformation Platforms

Analysis By: Stessa Cohen

Definition: Digital banking transformation platforms support an open banking strategy. These platforms enable a bank to deliver any customer service or functionality to customers or systems on any device or channel, to third parties and to external partners. The platform allows the bank to create collaboration, aggregation, creation and matching capabilities that support the development of new business models and services. These platforms use both internal and external APIs and allow the bank to execute empathic services.

Position and Adoption Speed Justification: Platforms support common banking transactions and processes. Many providers support marketplaces that the bank can access through its deployment of the DBP. Platforms support open-API-based architectures that enable banks to orchestrate new and existing processes and offer innovative digital services via any device or channel. Due to the emergence of new providers and continued bank demand for DBPs, the technology, while still maturing, is only just past the peak of hype. In the past year, Gartner has noted significant changes in the deployment of DBPs. These changes have led us to identify two approaches, Type X and Type Y. The Type X platform has a higher degree of focus on enabling the bank — or nonbank — to achieve digital business models. It enables business innovation by connecting an open platform to internal and external business ecosystems and platforms. The Type Y approach is focused more on aggressive business optimization and the transition to digital transformation. Gartner anticipates the evolution of a third type of digital banking solution that bridges digital banking optimization and transformation approaches.

Digital banking platform technology will continue to mature, although banks remain cautious about deploying them. Few are using a DBP across the enterprise or to create new business models or new services. This is the case because many banks that prioritize digital transformation first seek to drive value through business optimization. Other banks have not yet begun organizational changes required to leverage the transformative capabilities of the platform. Still, other banks view digital banking transformation platforms as a risky choice. For these reasons, banks may choose to adopt a digital banking optimization solution before they move to a digital banking transformation

platform. This year, Gartner has adjusted the adoption speed to “five to 10 years” to align with the slower speed of adoption of transformation platforms compared with optimization solutions.

User Advice:

- Choose the digital banking transformation platform approach when the bank has begun organizational and cultural changes necessary to support transformation and other fundamental innovations. These changes — including process and transaction integration across lines of business, products and services, and IT silos — require strategic and budgetary support by the CEO, the board of directors and senior management. If the bank’s primary driver for digital banking is IT cost optimization, choose a digital banking optimization solution.
- Separate customer experience from transactions. Customers expect their mobile experience to be different from accessing the bank’s website. Take into account customer location and other contextual information.
- Not limit the evaluation process to incumbent banking vendors or discount other vendors based on length of experience, customer list or market focus. Work with business leaders and other key stakeholders to assess the bank’s comfort with, and ability to manage, the risks associated with using new providers. These providers include Active.Ai, Advantage FSE, Apiture, Appway, Asseco Poland, Asseco South Eastern Europe, Backbase, Banking Software Company (BSC), CoCoNet, CR2, CREALOGIX Group, D3, ebankIT, EdgeVerve Systems, Fidor Solutions, Finastra, FIS, five degrees, IBM (Open Banking Framework), ieDigital (formerly Intelligent Environments Europe), i-exceed, Intellect Design Arena, Kony, Leveris, Malauzai Software (acquired by Finastra), nCino, NETinfo, Novabase Business Solutions, NYMBUS, Objectway, Oracle, Salesforce Financial Services Cloud, Technisys, Temenos, TODO1, Ubanquity, Unisys, Salesforce, solarisBank, Stacc, and Zenmonics.
- Prepare for extensive, potentially disruptive changes in this market, including merger and acquisition activity, heightened competition and new entrants from outside your geographic region.
- For new or challenger digital banks, evaluate digital banking platforms to lay the foundation to support both common banking transactions and innovation.

Business Impact: Digital banking transformation platforms are different from digital banking optimization solutions. The latter are primarily focused on channel replacement, increasing customer profitability, lowering digital services and reducing friction. A digital banking transformation platform can accomplish these goals, but its true value is in its ability to support a digital business strategy. The banks that realize transformational benefits will be those that choose solutions that enable them to create new business models, products and services. These services will leverage not only bank systems, transactions and processes, but also customer and other relevant data and the partner ecosystem. Digital banking platforms are a key part of what digital business technology platforms will look like in banking.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Apiture; Appway; CREALOGIX Group; five degrees; Intelligent Environments; Leveris; Technisys; TODO1; Ubanquity

Recommended Reading: "How CIOs Can Choose the Right Digital Platform for Their Banks' Specific Needs"

"Market Guide for Digital Banking Platforms"

"CIO: How to Choose the Right Approach to Digital Banking"

"Empathic Banking: CIOs Can Drive New Revenue by Anticipating Customers' Needs"

NLP

Analysis By: Bern Elliot; Erick Brethenoux

Definition: Natural language processing (NLP) or natural language technologies (NLT), enables an intuitive form of communication between humans and systems, i.e., NLP includes computational linguistic techniques aimed at parsing, interpreting (and sometimes generating) human languages. NLP techniques deal with the pragmatics (contextual), semantics (meanings), grammatical (syntax) and lexical (words) aspects of natural languages. The phonetic part is often left to speech-processing technologies that are essentially signal-processing systems.

Position and Adoption Speed Justification: Enterprise NLP usage is increasing as capabilities improve, along with new use cases based on conversational agents and automatic machine translation, among others. Existing syntactic- and semantic-based methods are increasingly augmented and displaced with deep neural networks (DNNs) approaches, which are also referred to as sub-symbolic techniques.

Visible accomplishments include technologies that:

- Improve natural language parsing (via Google's SyntaxNet, an open-source, DNN-based, natural language parsing framework for TensorFlow).
- Translate in real time from one spoken language to another (as in Microsoft's Skype Translator).
- Build large-scale knowledge graphs (illustrated by the work of Google, IBM and Microsoft).
- Offer answers instead of a list of page links (as in Google's information cards).
- Use of transfer learning to bootstrap training of new languages (research report by Amazon)

However, human language is complex and deeply influenced by cultural and other idiosyncratic conditions. So while NLP solutions have made progress, there are many subtleties and nuances that require human intervention to enable proper interpretation. These limitations are slowing adoption. For instance, dialogue capabilities are weak, DNNs are experimental and fragile, and understanding, inferences, context and synthesis pose significant challenges. Additionally, many NLP solutions require specialists in order to ensure continued accuracy of the grammars and models.

User Advice: NLP offers enterprises significant opportunities to improve operations and services. For many enterprises, the strongest and most immediate use cases for NLP are related to improved customer service (impacting cost, service levels, customer satisfaction and upselling), employee support (including making them smarter and more effective in their work) and automation of legal tasks (such as contract analysis, compliance enforcement, etc.).

Initial projects should start with modest goals in order to demonstrate success. As experience is obtained, projects should iterate, and scope can increase. More accessible use cases include translation of blogs and other casual documents, or mining text from customer interactions for insights on sentiment or issues is one of the more accessible use case.

Additional current NLP opportunities exist for enterprises but are not as mature, or will require effort before they provide consistent returns on investment. Translation or transcription services, for instance for meetings or documents, offer opportunities to improve operations and lower costs. However, these NLP-based solutions are less accurate than similar human-based options and may benefit in some cases from human involvement.

As enterprises enhance their NLP implementations, new skills should be explored. Computational linguists, for example, are versed in the manipulation of various linguistic techniques and the impact of natural communications on users. Upskilling of data scientist talents might also be necessary given the increasing use of data science techniques in NLP applications.

Finally, the quality of NLP solutions offering knowledge-based consolidation, content mapping, search enhancements and text summarization will vary. As a result, enterprise planners should test and verify the effectiveness of these solutions before making significant commitments. If enterprises invest in specialized grammars, care should be taken that these be compatible across vendor solutions.

Business Impact: To obtain clear near-term ROI and to build enterprise knowledge and skills in the area of NLP, planners should leverage NLP applications such as:

- Virtual assistants and chatbots to improve interactions, including employee and customer services in select environments.
- Text mining to extract and summarize the focus of textual reports and preview what questions are most common before building chatbots.
- Basic transcription and translation services.
- Language-generation applications that produce natural language descriptions of tabular data, making it easier for many to understand.
- Keyword tagging in documents, making it easier to determine relevant sections or to extract other information such as intent and entities.
- Content moderation services that examine user-generated content (text or images), to flag potentially offensive content or to identify fake news in social media.

- Sentiment analysis to identify the feeling, opinion expressed in statements — from negative to neutral, to positive.
- Search improvements by better understanding the intent of a search query as well as by summarizing content that is retrieved.
- Text analytics to quickly process large numbers of organizations' documents and determine their compliance or legal validity.
- Advancement in insight engine text capabilities combined with more advanced NLP functionality.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Emerging

Sample Vendors: Bitext; Clarabridge; CognitiveScale; Digital Reasoning; Google; IBM Watson; Microsoft; Narrative Science; SAS; Yseop

Recommended Reading: "Market Guide for Social Analytics for Marketing Leaders"

"Cool Vendors in AI for Conversational Platforms, 2017"

"Cool Vendors in AI Core Technologies"

"A Framework for Applying AI in the Enterprise"

Sliding Into the Trough

Bank Orchestration Platform Model

Analysis By: Stessa Cohen

Definition: A digital business platform enables people, businesses and devices to create value in new ways, both inside and outside the bank. Gartner defines four new business model types that flow from adopting digital business platforms: collaborating, orchestrating, creating and matching. An orchestration platform allows the bank to bring many different components together to deliver combined value to existing customers and partners.

Position and Adoption Speed Justification: Platforms expose existing enterprise assets like algorithms, data, resources and analytics. Adoption of an orchestration platform relies on the bank having on open banking strategy. It also requires buy-in from relevant senior executives and other stakeholders to create an open platform that will support not only existing customer and partner relationships, but also drive maximum participation and network effect with new participants. Like other platform models, orchestration platforms leverage open banking technologies, such as APIs. This platform can also include an API developer portal or marketplace. APIs enable the bank to expose enterprise assets and selected functionality of their internal systems to their existing and

new customers and business partners to enable monetization of bank's core competencies in technology, data, algorithms, security and other back-end services. Orchestration platforms are positioned as post-peak 25% as they have the potential to disrupt markets by exposing opportunities for the bank to create new customer and supplier relationships. Bank CIOs can adopt these technologies from providers outside of banking and adapt them for banking purposes.

User Advice:

- Determine whether the bank is ready to operationalize its open banking strategy by identifying whether senior bank executives and senior IT and business stakeholders are on board with pursuing a public platform that exposes the bank's data and algorithms to potential and new customers and partners.
- Align open banking strategy with other API-related initiatives in the bank, such as integration and employee-facing digital transformations.
- Leverage the orchestration platform model to create new relationships and value with and for customers, partners and suppliers.

Business Impact: Orchestration platforms can support internal and external innovation initiatives and collaboration. Because they focus on creating new customer relationships, rather than public platforms, collaboration platforms will likely, not by themselves, create new business models. These types of platforms are best suited for banks that are focused on business optimization. The financial benefits (lower coordination costs) of this style result from delivering one-stop-shop, big-picture or command-center capabilities. This is accomplished through improved decision making and bundling to create new products/services. CIOs whose banks have a digital business optimization strategy probably will not be pursuing the vision of the bank as a platform. Bank CIOs that have coherent open banking strategies can leverage the orchestration platform to create a competitive advantage for the bank. The orchestration platform also allows the bank's partners to create new products/services, using the bank's APIs. For example, a bank that can orchestrate commercial relationships on behalf of SMB customers could compete against both existing banks with SMB services but also challenger SMB banks and digital giants that are starting to provide these services.

Bank CIOs pursuing optimization should not turn their backs on open banking strategy and technologies. The CIO must work closely with senior business executives across all lines of businesses to align optimization goals and initiatives with open banking technologies.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Recommended Reading: "Industry Vision: Open Banking"

"How to Select the Best Platform Business Model"

"Use Business Models to Guide Digital Business Transformation"

"Digital Business Models for the Economics of Connection"

"2019 CIO Agenda: A Financial Services Perspective"

Bank Collaboration Platform Model

Analysis By: Stessa Cohen; Alistair Newton

Definition: A digital business platform is an architectural innovation that lets people, businesses and devices create value from the inside out, through co-creation, and from the outside in for the bank. An orchestration platform facilitates the bank's ability to bundle and coordinate many disparate areas for customers, partners and providers. The digital bank collaboration model is a style of platform model that amplifies the bank's existing collaborative relationships in a business ecosystem.

Position and Adoption Speed Justification: Platforms expose existing enterprise assets like algorithms, data, resources and analytics. Adoption of a collaboration platform relies on the bank having an open banking strategy. It also requires buy-in from relevant senior executives and other stakeholders to create a platform that will support existing customer and partner relationships. Like other platform models, collaboration platforms leverage open banking technologies, such as APIs. Collaboration platforms are positioned as post-peak hype 30% as they have the potential to disrupt traditional supply chains. They do this by exposing opportunities for the bank to enhance existing customer and supplier relationships. Bank CIOs can adopt these technologies from providers outside of banking and adapt them for banking purposes.

User Advice:

- Create the business case for use of the collaboration platform by identifying both internal and external collaboration use cases.
- Identify opportunities for innovation that minimizes risk by creating an internal collaboration platform that facilitates innovation across lines of business between IT and business.
- Support collaboration platform model by identifying potential partners among the bank's existing customers and suppliers.

Business Impact: The collaboration platform model can support both internal and external collaboration. Internal collaboration can facilitate innovation across lines of business between IT and business. This use of the collaboration platform does not involve the risk of exposing data, processes or algorithms outside of the bank. The bank can gain the most value in collaboration with existing partners and customers outside of the bank. For example, a bank may want to monitor transactions made via all of its fintech partners, the fintech needs to be able to identify the customers using its services via its partnership with the bank and the products or services used by the customer. The bank can build a platform to allow this type of monitoring that spans all of its fintech partnerships in its ecosystem. The financial benefits (e.g., speeding up ease and reducing costs of collaborating) of this style are mainly derived by removing friction across players that are

collaborating. External collaboration requires the bank to expose its platform publicly. The bank's ability to leverage this platform model for innovative services depends on its ability to view the platform within a larger digital strategy. For example, banks that take a strategic view of the collaboration-based platform will be able to adapt to regulations such open banking and Second Payment Services Directive (PSD2) regulations and use them to facilitate collaboration more easily than other institutions.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Recommended Reading: "Industry Vision: Open Banking"

"How to Select the Best Platform Business Model"

"Use Business Models to Guide Digital Business Transformation"

"Digital Business Models for the Economics of Connections"

Hybrid Cloud

Analysis By: Don Free

Definition: Hybrid cloud computing is the coordination of cloud services across public, private and community cloud service providers to create another cloud service, which is how it differs from multicloud computing. A hybrid cloud computing service is automated, scalable, elastic, has self-service interfaces and is delivered as a shared service using internet technologies. Hybrid cloud computing needs integration between the internal and two or more external environments at the data, process, management or security layers.

Position and Adoption Speed Justification: Adoption of hybrid cloud in banks still lags other industries due to lower public cloud adoption by banks, but digital business strategies — increasingly reliant on collaborative partnerships — are increasing demand among banks. A lack of hybrid cloud offerings tailored to banks also hinders adoption. However, since hybrid cloud can present banks with a viable cloud alternative sensitive to banks' concerns, we expect adoption to take place fairly rapidly as bank-targeted hybrid cloud options become available and as best practices form.

Although frameworks for data protection such as GDPR are evolutionary, enhanced interoperability may provide a foundation for enabling broader adoption of hybrid cloud. While hybrid cloud is positioned close to the peak midpoint and at less than 2% overall adoption, we expect hybrid cloud to be inextricably linked to public cloud usage. Thus, it will reach the Plateau of Productivity in banks within five years.

User Advice:

- Establish security, management, and governance guidelines and standards to coordinate the use of services with internal (or external) applications to form a hybrid environment.
- Coordinate hybrid cloud services with noncloud applications and infrastructure to support a hybrid IT model.
- Create guidelines/policies on the appropriate use of the different hybrid cloud models.

Business Impact: Hybrid cloud enables selective use of public, private and community cloud, allowing banks to receive the desired agility and cost savings of cloud while addressing banks' concerns regarding security, privacy and regulatory compliance. It leads the way to a unified cloud computing model in which a single cloud is made up of multiple sets of cloud facilities and resources (internal and external). These can be used as needed based on changing business requirements, offering the best-possible economic model and maximum agility while setting the stage for new ways for banks to work with customers, partners and other relevant third parties. Meanwhile, less ambitious hybrid cloud approaches still allow for cost optimization, flexible application deployment options and a coordinated use of internal and external resources.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Alibaba Cloud; GoldenSource; Google; Hewlett Packard Enterprise; IBM; Microsoft; Red Hat; VMware

Recommended Reading: "The State of Hybrid Cloud"

"Market Guide for Managed Hybrid Cloud Hosting, North America"

"Prepare for AWS Outposts to Disrupt Your Hybrid Cloud Strategy"

"Market Guide for Managed Hybrid Cloud Hosting, North America"

"Utilizing Hybrid Architectures for Cloud Computing"

"Solution Path for Developing Enterprise Hybrid Cloud Strategies"

"I&O Leaders Must Plan for Hybrid Cloud Orchestration"

"Market Guide for Cloud Management Platforms"

"Cloud Adoption Is Driving Hybrid WAN Architectures"

Public Cloud for Core Banking

Analysis By: Don Free

Definition: Public cloud for core banking is a derivative of cloud computing used by banks to source their mission-critical systems of record. The earliest deployments consist of single-instance, shared core banking software associated with multientity or bank-specific database deployments.

Position and Adoption Speed Justification: Demand for core banking deployments on public cloud is on the rise. Within a recent Gartner legacy modernization survey, 64% of bank respondents state that cloud computing has a major role when modernizing their core IT systems. Current use cases are limited to neobanks, low-tier banks (microfinance) and banks with low account transaction volumes, but the next set of banks poised to deploy this technology include universal banks and piloted models by large-tier banks.

Public cloud providers are becoming sensitive to data privacy concerns by providing in-country public cloud offerings, but broad adoption across all banking tiers will remain elusive until prominent use cases are established by progressive banks.

The majority of central banks have not specifically prohibited public cloud deployments, and many are beginning to take a more proactive role with outreach efforts to form consensus guardrails for this model. Barriers include network connectivity, especially within emerging markets. Gartner predicts that obstacles to adoption will diminish as empiric public cloud experiences increase over a two- to three-year period, culminating in mainstream adoption within a three- to four-year time horizon.

User Advice: Banking CIOs should:

- Initiate the public cloud conversation with regulators. Some central banks will not establish a position absent of bank demand for this deployment model.
- Submit proposals for incremental public cloud deployments of targeted market segments with lower-risk, data privacy profiles. Narrowly targeted go-to-market models that focus on subsegments such as short-term SMB lending, microfinance, unbanked/underbanked and low-end retail banking markets are ideal candidates for initial deployments of public cloud processing.
- Experiment with public cloud infrastructure to become more familiar with this deployment model. Public cloud development and test environments are increasingly used to leverage elasticity.
- Explore the competitive landscape for public cloud providers. Start the discovery effort with core banking vendors that are promoting public cloud capabilities.

Business Impact: Public cloud is the future service model for accessing bank technology to support innovation and a means to rationalize IT operational requirements. Gartner predicts that resources for business support will increasingly be derived from external sources to accommodate the fast pace of change within the banking industry. The impact of this business change will force banks to source commodity functions to realize increased agility objectives and economies of scale on a more granular basis.

Bank IT organizations will have to prepare for public cloud sourcing through restructuring to accommodate a distributed sourcing model that repositions IT as a broker of technology.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: EdgeVerve; Mambu; Ohpen; Temenos Group

Recommended Reading: "Critical Capabilities for Global Retail Core Banking"

"Magic Quadrant for Global Retail Core Banking"

"Cloud Heat Map for Banking, 2017"

Digital Personal Financial Advisor

Analysis By: Alistair Newton

Definition: A digital personal financial advisor (DPFA) is a set of technologies that uses customer data from multiple sources. Through applying data analytics and artificial intelligence, it develops a deep insight into customer behavior and customers' personal financial habits. Consequently, the DPFA can nudge customers toward "better" financial outcomes and proactively help customers to make better decisions related to their financial well-being.

Position and Adoption Speed Justification: There have been some significant steps forward in establishing the environmental and regulatory context that would be necessary for DPFAs to flourish and survive, with the roll out of PSD2 and Open Banking in Europe and the wider impact of these regulatory changes being discussed and adopted across multiple other countries and regions such as Australia, Canada, Singapore and Hong Kong, as well as a number of countries across the Gulf region. In addition, solutions from the likes of Tink and Rakuten Slice have started to deliver capabilities that add value to their users. However, it has not all been plain sailing, with privacy concerns and problems with the basic functions of PSD2 hindering progress. As such Gartner has left the time to the Plateau of Productivity in the two-to-five year time span. It is also recognized that in some geographies (notably the United States) the time span may exceed the five-year target. Equally, it is recognized that this sort of functionality is not something that every customer will wish to use. The market penetration of digital virtual assistants (such as Amazon's Alexa and Google Advisor) and the growth in "connected" vehicles will be additional factors in adoption. Another factor is the increasing sophistication of natural language processing capabilities that will enhance the overall customer experience when using DPFAs.

User Advice: As a bank, it does not follow that you should automatically be offering your own customers DPFA capability. That decision will depend on your business strategy and your capabilities in the area of open banking and advanced analytics and AI.

However, in regions where open banking is developing, customers will be able to access this sort of functionality, whether supplied by banks or other competitors. In many markets the DPFA functionality would in effect become a de facto customer interaction "layer," with the provider being responsible for interactions with the customer. The DPFA layer would be linked to a customer's primary transaction account, or would take on that role. In effect the actual providers of the core financial services products — such as deposits and lending — would become commodity providers of services, with little or no contact with their customers. Sacrificing the customer relationship in this way would require a significant change in business model for most heritage financial services firms.

This sort of DPFA functionality will be particularly attractive to many of the new digital startup banks, as providing truly empathic and connected financial solutions to their customers sits as part of the DNA for many of these new startups. Indeed, for many, this will be their only sustainable route to profitability.

Bank CIOs should develop a clear roadmap for DPFAs in your organization and would be advised to take the following steps:

- Plan to integrate DPFA functionality for your customers into your mobile banking application
- If you decide not to offer a customer-facing solution, from a competitive intelligence and marketing point of view you should develop the capability to mimic DPFA advice internally, to understand the "best advice" your customers might be offered
- Invest in data analytics that will enable you to proactively answer customers' questions and solve their problems
- Allow customers to supply their own data points, rather than simply repackaging existing bank statements and static information

Business Impact: DPFA capabilities are not channel- or device-specific; they will work best when implemented within other services, and will become especially impactful when linked to developments in voice-activated biometric digital banking. Their transformational value can be realized by delivering relevant insight to any device, including smartphones, tablets, wearable devices, digital wallets, connected vehicles and digital virtual assistant platforms.

However, the primary business impact will be the facilitation in shifting the customer relationship, from existing heritage providers of financial services products, to the providers of DPFAs themselves. While the likes of Amazon, Google, Tencent and Alibaba Group will play a significant role in the development of the digital virtual assistant markets, because of the high levels of trust required by most customers when it comes to financial-services-based advice, it is felt that in mature financial services markets, the primary beneficiaries of this sort of technology development will likely be the swathe of new digital-only startup banks.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Blockchain in Banking and Investment Services

Analysis By: David Furlonger; Rajesh Kandaswamy; Fabio Chesini

Definition: Blockchain in banking and investment services (B&IS) refers to a broad and diverse portfolio of financial services (FS) that will be transformed by blockchain technologies. Blockchain-enabled FS are built on an expanding list of cryptographically signed, irrevocable blocks of records shared by all participants in a P2P network. Each block of records is time stamped and references links to previous data blocks. Anyone with access rights can trace historically a state change in data or an event, belonging to any participant.

Position and Adoption Speed Justification: The banking and investment services industries continue to experience significant levels of interest from innovators seeking to improve decades old operations and processes. The industry leads all other industries in terms of POC interest. Yet challenges remain in moving POC development into mainstream production environments and there is still an underlying question mark from industry participants about how much of a game-changing technology blockchain is. Only 7.6% of respondents to the annual Gartner CIO survey suggested it was. That said, nearly 18% of banking and investment services CIOs say they have or will adopt some form of blockchain technology within the next 12 months and nearly another 15% within 2 years.

Regulation, security and the inner working of the industry are frictional drags. Although tokens are starting to be discussed more pragmatically and both institutional and retail interest exists, mainstream adoption is a long way from reality. Payment, trade finance and KYC/identity initiatives are underway in many locations. However, decentralization as a topic is barely mentioned. The focus for blockchain in the industry is clearly slanted to private distributed ledger contexts, either in consortia or among small collaborative groups of peers.

Positive cost benefit outcomes are hard to discern, but sufficient promise in terms of perceived efficiency gains is enough to maintain momentum. We still believe technical issues need to be resolved, standards introduced and more attention paid to the winners and losers in new blockchain-based relationships determined if the industry is to traverse the trough quicker than currently anticipated. Many institutions may get lulled into a false promise of limited scope blockchain inspired solutions, especially via consortia. While these solutions may help protect the centralized business model, the tipping point to a more decentralized and tokenized context via blockchain complete solutions is likely to disrupt the traditional industry before the current time to plateau.

User Advice:

- Create a strategic evaluation framework that includes assessments of technology platforms, information and wallet security, regulatory criteria, use-case applicability/value, interoperability and startup provider viability.
- Monitor the evolution of blockchain technologies, standards, platforms and consortia. Use the strategic evaluation framework to identify tipping points for more aggressive adoption.

- Brief business peers on the business outcomes and risks of blockchain capabilities; set appropriate expectations and identify future opportunities.
- Develop viable blockchain use cases (including those benefiting from decentralization and tokenization) and validate through such innovative lab work as hackathons, accelerators, etc.
- Use extreme caution when interacting with vendors; verify use of blockchain and production experience. Avoid vendor lock-in from replatforming exercises and maintain a clear focus on interoperability.
- Carefully evaluate consortia participation and assess likelihood and timeline of business output value.

Business Impact: Blockchain has appeared in several key areas within the industry but focused on centralized/permissioned ledgers. Gartner expects continued developments in the creation and acceptance of digital (including crypto) currencies from a consumer payment, investment and central bank perspective. There are long-term opportunities to use blockchain across all lines of business for document/information management and transactions, which play a pivotal role in such business processes as mortgage contracts, swaps, custody and collateral management, policies, financial planning, etc. — subject to forthcoming legal and accounting frameworks. Blockchain could also accelerate the use of peer-to-peer lending and other fintech business models including capital raising.

Considerable work needs to be completed in nontechnology-related activities in order for blockchain capabilities to reach the Plateau of Productivity. FS lacks agreement on governance frameworks, and while there are signs of collaboration via different consortia, many efforts are competing and regulatory initiatives are not yet fully cohesive. Moreover, even if central utilities develop to improve operational market effectiveness, each enterprise will need to make significant organizational, technical and business model changes to either protect their franchise in the long term (e.g., due to decentralization) or reconcile blockchain technologies with their existing infrastructure.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Barclays; BBVA; Citi; Credit Suisse; HSBC; JPMorgan Chase; Nasdaq; Royal Bank of Scotland; Santander

Recommended Reading: “Top 10 Strategic Technology Trends for 2019: Blockchain”

“Guidance for Assessing Blockchain Platforms”

“4 Types of Blockchain Business Use Cases That Investment Management CIOs Need to Track”

“Blockchain in Digital Business: What the Board Needs to Know”

Payment Data Monetization

Analysis By: Christophe Uzureau

Definition: Payment data monetization refers to the ability to extract value from payment data (either raw payment data, composite data that also include customer details and preferences or transformed data making use of big data analytics and artificial intelligence) to obtain insights to improve customer services, decisions as well as product and business development.

Position and Adoption Speed Justification: This profile also includes self-monetization and negotiation where customers make use of data services and tools to generate revenue or obtain better deals and terms and conditions — for example, by holding reverse auctions. Banks (and other providers) have a role to play in facilitating self-monetization such as providing the tools and interfaces to enable the monetization process, but could also manage negotiation tools on behalf of customers.

Delivering value from payment data is an ongoing challenge for most banks. It is especially difficult to find a relevant starting point to build a cohesive strategy to exploit such data and build new services. This is caused by the complex organizational silos through which payment data is accessed, flows and circulates. Payment data is everywhere and nowhere in the bank. However, banks are trusted to handle their customer data. According to Gartner Financial Services Digital Banking & Payment 4Q18, 45% of respondents in the U.S., 53% in the U.K. and France would trust their main bank (where they have their checking/current account) the most to manage their personal data safely and responsibly.

Most of the banks Gartner is working with have recognized the benefits of payment data monetization as well as the window of opportunity created by the growing customer concerns of how some digital giants handle their data and privacy. And thanks to regulations such as Second Payment Services Directive (PSD2) in Europe, fintech startups are able to experiment with new payment data sources and accelerate the development of data monetization tools. Regulators outside Europe are also exploring their own version of PSD2 to drive open banking such in APAC (Australia, Taiwan and HK among others).

As a result, while challenges remain, we position this profile to peak-through midpoint and expect that the development of open banking regulations combined with technical solutions (platforms/APIs) globally will contribute to the maturity of payment data monetization capabilities.

User Advice:

- Build a customer data strategy by first designing an organization wide roadmap to monetize payment data.
- Use transformed data enabled by big data analytics, algorithms and AI to support customer self-monetization and negotiation
- Combine payment data with external data such as from IoT in order to transform and further contextualize payment data.

- Introduce new governance models around the collection, access to and most importantly the sharing of payment data across the organization.

Business Impact: The GAFABAT continues to build or acquire data collection and storage capability, which represents a persistent threat for banks. Both Ant Financial and Tencent in China have built a solid competitive edge in capturing and analyzing customer data. For European banks impacted by PSD2 as well as the GDPR, building a dedicated payment information services roadmap combined with consent management tools/services is a priority. This would help them deal with the impact of aggregation services and fend off fintech startups that favor bank product switching. Non-European banks are also likely to be impacted by similar regulations in the future, notably in the U.S., where aggregation services adoption has been higher than in Europe. As a result, payment data monetization is urgent for banks. And responding to those threats would make the business impact high. However, in most markets, banks are still trusted to handle customers' more sensitive financial data. And since payment data monetization paves the way for new revenue streams for the bank, thanks to new roles such as that of data broker and the development of negotiation tools on behalf of customers, we rate the business impact as transformational.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Amazon; Ant Financial; BitsaboutMe; Datawallet

Recommended Reading: "Customer Payment Data, a Catalyst for Digital Banking Transformation"

"Make PSD2 Pay the Change"

"Gartner's Digital Banking Taxonomy 3.0 — How to Focus Your Transformation Efforts"

"Start Conversations With Your Digital Banking Customers"

"Gartner's Digital Banking Customer Advisory Framework"

Roboadvisor 2.0

Analysis By: Darrin Courtney

Definition: Roboadvisors 2.0 are collaborative online financial tools that use algorithms to perform basic and more advanced investment management and financial planning functions. They can accept input from both the client and the advisor. Client access and features are set by the advisor or wealth management (WM) firm, and the tools can be integrated with the advisor's or wealth manager firm's CRM and other applications to provide a holistic view of individual clients.

Position and Adoption Speed Justification: Roboadvisors 2.0 have progressed deeper into the adolescent phase as more firms begin rolling out hybrid approaches to digital advice delivery. Roboadvisors 1.0 are stand-alone tools that offer little interaction with wealth managers or

integration with the clients' broader financial position or goals. Vendors are beginning to commercialize institutional-grade roboadvisor 2.0 tools intended for wealth managers and their clients across multiple channels. These tools will provide predictive and prescriptive information to enable advisors to provide personalized advice at scale. Current capabilities vary. Therefore, we expect WM firms to take a measured approach to deploying these tools in the U.S., Europe and other areas where the WM segment is well-developed. Because of this, progression on the Hype Cycle is minor. However, innovative firms in developed markets and WM firms in emerging markets may move more aggressively and introduce these tools sooner. As vendors, WM firms and clients become more familiar with roboadvisors 2.0, Gartner expects these tools to mature in developed markets within five years.

User Advice: Deploying roboadvisor 2.0 is more than simply introducing a new tool or point solution. WM firms and advisors must rethink the way they view algorithmically powered investment advice. Roboadvisors 2.0 are not stand-alone, self-directed tools for individual investors, but are, instead, purpose-built platforms for advisors, firms and clients. Roboadvisors 2.0 have the potential to transform the relationship between firms and their clients by creating a collaborative and integrated environment that supports client preference and firm segmentation needs. WM firms will need to change the advisor and relationship manager's workflow, as well as undergo organizational changes to implement roboadvisor 2.0 platforms. These tools need to be integrated with internal advisor systems, such as financial planning, as well as potential third-party and partner systems, such as aggregation platforms, to create a more-detailed and integrated view of clients: In short, create a single source of client data. Adopting roboadvisors in a staged approach may limit potential disruption to advisors and clients. Work with relationship managers and investment professionals to evaluate the advisors' current workflow and client engagements to determine where to initially introduce roboadvisor 2.0 capabilities.

Business Impact: The use of roboadvisor 2.0 will increase customer-centricity, free up valuable advisor time and change the conversation from cost to value in the current environment of competition and fee pressure. Gartner believes that the future of WM will combine advisor-led coaching, financial planning and other services with digital tools to meet the increasingly complex and collaborative client requirements, and do so in a more cost-effective manner. These tools may also enable some firms to capitalize on new business strategies, such as entering adjacent segments like the mass affluent or offering new asset classes on digital platforms to more-sophisticated high-net-worth and ultrahigh-net-worth digital investors. As WM firms and their clients use these tools, the amount of information collected on client preferences and advisor support will significantly improve the personalization and contextualization of financial coaching and related investment strategies.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: additiv; Addepar; Backbase; FutureAdvisor; iQuantifi; Invesco (Jemstep); Investcloud; Marstone; Trizic; Vestmark

Recommended Reading: "Improve 3 Areas to Support Digital Business Transformation in Wealth Management"

"Integrate Advisor Supporting Technologies Into Digital Platforms to Accelerate Advisor Adoption"

"Enhance the Collaboration Experience in Client-Facing Technology to Improve Digital Empathy"

Digital Banking Optimization Solutions

Analysis By: Stessa Cohen

Definition: Digital banking optimization solutions support integration that enables a bank to deliver a service or functionality to customers on any device or channel, as well as to third parties and external partners. This approach is more applicable to organizations that may not have the cultural maturity to adopt a full-fledged digital platform.

Position and Adoption Speed Justification: Digital banking optimization solutions was renamed from digital banking multichannel solutions to reflect the alignment of this type of digital banking solutions with the bank's strategic goal. Nonbanks and banks continue to seek solutions that prioritize business optimization over digital transformation. Many bank CIOs struggle with managing the conflicting priorities of transformation and business optimization in the project to overhaul the bank's digital delivery strategy. At the same time, digital banking optimization solution technology has continued to evolve, pushing it closer to the Trough of Disillusionment. Providers offer solutions that enable the bank to focus on improving efficiencies and costs in delivering supported channels, as well as customer experience. They typically do not support the orchestration capabilities. In addition, digital banking optimization solutions typically do not focus on connection to other external or internal platforms. However, digital banking optimization solutions meet many banks where they are in their digital banking journey. The bank CIO's ability to reduce costs of digital services, streamline business processes and measurably improve customer experiences can provide a foundation for movement toward a strategy driven by digital transformation. Further, many providers enable bank CIOs to deploy a single solution that achieves these goals across multiple lines of businesses. Doing so can achieve even more optimization and profitability of existing business models and services. Gartner expects some digital banking optimization solutions to evolve into digital banking transformation platforms. A few vendors in this space have already begun to do so. Gartner also expects new providers to enter the market.

User Advice: Bank CIOs:

- Choose the digital banking optimization approach when the bank has made IT cost optimization a priority and has not yet made the organizational and cultural changes necessary to support digital transformation and other fundamental innovations. If the bank's primary priority is transformation, then choose a digital banking transformation platform.
- When evaluating providers and their offerings, prioritize those that enable the customer to start and complete tasks across devices and channels. Also prioritize those that enable the bank to deploy the solution across as many lines of business as possible to drive the greatest cost savings.

When evaluating providers,

- Work to separate the customer experience from the transaction. Customers will expect and want their mobile experience to be different from that of accessing the bank's website. The customer's experience on a device should take his or her location and other contextual information into account.
- Do not limit the evaluation process to incumbent banking vendors or discount other vendors based on length of experience, customer list or market focus. But work with business leaders and other key stakeholders to assess the bank's comfort with, and ability to manage, the risks associated with using new providers, especially financial technology startups. These providers include: ACI Worldwide, Asseco SEE, Comarch, D3 Banking Technology, Diasoft, Epiphany, Fiserv, FIS, NCR (Digital Insight), OMNIA, Q2, SAP, ti&m, Unisys, VSoft, VeriTran, VeriPak.
- Prepare for extensive, potentially disruptive changes in this market, including merger and acquisition activity, heightened competition and new entrants from outside your geographic region.
- Prepare for the evolution of both your digital banking strategic priorities and of this technology toward digital banking transformation.

Business Impact: Banks pursuing digital strategies focused on business optimization can use multichannel solutions to eliminate online and mobile banking application silos, integrate digital and physical channels and devices, and deliver digital services to all these channels and devices, whether customer- or bank-owned. The banks that realize the greatest optimization benefits from this technology will be those that choose solutions that enable the bank to consolidate all of their online and mobile banking on a single solution. The selected solutions will also offer the banks the opportunity to create new customer interfaces that reflect current design and customer requirements. These capabilities will enable the bank to leverage not only bank systems, transactions and processes, but also fintechs and more traditional third-party systems. New or challenger banks will likely not adopt digital banking optimization solutions as they do not provide significant opportunity for long-term differentiation in supporting new business models and revenue generation.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: D3 Banking Technology; Diasoft (FLEXTERA); Fiserv; FIS; NCR (Digital Insight); OMNIA; Q2; VeriPark; VeriTran; VSoft

Recommended Reading: "CIO: How to Choose the Right Approach to Digital Banking"

"Market Guide for Digital Banking Multichannel Solutions"

"Empathic Banking: CIOs Can Drive New Revenue by Anticipating Customers' Needs"

"How a CSP-Bank Partnership Can Accelerate the Digital Banking Transformation in Developed Markets"

Public Cloud

Analysis By: Don Free

Definition: Public cloud computing is a style of computing where scalable and elastic IT-enabled capabilities are provided as service cloud computing technologies.

Position and Adoption Speed Justification: While public cloud for applications using nonsensitive data is gaining broader acceptance, these initiatives are primarily being driven by individual business pockets or on enterprise, non-mission-critical systems such as HR. However, overall use of public cloud is increasing, and banks' cloud-first strategies are transitioning to cloud-only strategies.

Barriers to adoption include limited bank-specific public cloud offerings and value-based business cases. Obstacles rise and fall as practical threats to increased adoption are met with practical responses such as country-based public clouds to address stringent data privacy concerns. As incremental acceptance by regulatory bodies grow, public cloud adoption is progressing in mission-critical systems such as core banking.

Against these barriers is a growing consensus among banks that public cloud accompanied by open bank systems will deliver its promise of business agility, cost reduction and scalability. Hybrid cloud models that bring together public and private cloud alternatives will drive adoption of public cloud.

Public cloud adoption in banks is sliding into the Trough, becoming mainstream in two to five years.

User Advice: Banking CIOs should:

- Do not regard public cloud only as a logical extension of private cloud initiatives. Look to the use of public cloud as a strategic alternative for expanding into new markets where you do not have the economies of scale or investments to support private cloud.
- Look beyond cost savings to business goals, such as agility and innovation, in justifying the use of cloud.
- Seek hybrid solutions that bridge public and private cloud to meet security, privacy, performance and regulatory requirements.
- Adopt API access to data and logic for all applications as an architectural principle.
- Require that all use of public cloud within your bank, including use by individual business units, be governed centrally to ensure consistency and integrity of operations.

Business Impact: Digital banks are seeking the increased business agility and efficiency of public cloud as they struggle to meet the demand for providing an increased array of self-service products, services and configurations in decreasing time spans. Public cloud can:

- Provide banks with rapid time to market for new products and services while reducing the sunk cost.
- Enable banks to rapidly scale up and down, supporting changes in demands and meeting temporary demands, such as for stress testing to meet regulatory compliance requirements.
- Free resources for the development of digital assets.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Amazon; IBM; Microsoft

Recommended Reading: "Magic Quadrant for Global Retail Core Banking"

"Market Definitions and Methodology: Vertical Industries"

Bank Creation Platform Model

Analysis By: Stessa Cohen

Definition: A digital business platform enables people, businesses and devices to create value in new ways, both inside and outside the bank. Gartner defines four new business model types that flow from adopting digital business platforms: collaborating, orchestrating, creating and matching. A creation platform allows the bank and other participants (internal and external) to build new value based on the platform.

Position and Adoption Speed Justification: Platforms expose existing enterprise assets like algorithms, data, resources and analytics. Adoption of a creation platform relies on the bank having an open banking strategy. It also requires buy-in from relevant senior executives and other stakeholders to create an open platform that will be public. That is, the platform must be open to known and unknown customers, suppliers and partners. The success of the platform requires participation and creation on the platform and a network effect with new participants. Like other platform models, the creation platform leverages open banking technologies, such as APIs. This platform can also include an API developer portal or marketplace. APIs enable the bank to expose enterprise assets and selected functionality of their internal systems to their existing and new customers and business partners to enable monetization of bank's core competencies in technology, data, algorithms, security and other back-end services. Creation platforms are positioned as at the trough as many banks have deployed a creation platform but few are seeing either significant adoption of or financial gains from them. Many banks have created this type of platform especially for developers.

User Advice:

- Determine whether the bank is ready to create a public digital platform by identifying whether senior bank executives and senior IT and business stakeholders are on board with pursuing a platform that exposes the bank's data and algorithms to known and unknown participants.
- Align the creation platform strategy with the bank's other API-related initiatives in the bank, such as integration and employee-facing digital transformations.
- Leverage the creation platform model to create new relationships and value with and for customers, partners and suppliers.
- Identify opportunities to innovate by combining the creation platform model style with another platform model such as matching.

Business Impact: Creation platforms can support innovation initiatives and create new value beyond the traditional scope of bank products and services. Because they rely on the ability of any participant being able to come to the platform to create a new service, these types of platforms are best suited for banks that are focused on digital transformation. The financial benefits of this style result from enabling platform participant creators to monetize their creations. Thus, this platform model is suited for those banks pursuing the vision of the bank as a platform. Bank CIOs that have coherent open banking strategies can leverage the creation platform to create a competitive advantage for bank outside the traditional realm of products and services. BBVA's Open Marketplace combines the features of a creation and matching platform. Open Marketplace enables startups to match with appropriate teams inside the bank and to develop services on the platform. Examples of other banks that have done so include: DBS, Deutsche Bank, HSBC, HDFC Bank, Nordea, ASB Bank, Citi and Santander. Bank CIOs can adopt these technologies from providers outside of banking and adapt them for banking purposes.

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Recommended Reading: "Industry Vision: Open Banking"

"Bank CIOs: Seek Inspiration and Evaluate Options Before You Deploy an Open Banking Strategy"

"2019 CIO Agenda: A Financial Services Perspective"

"The Economics of Connections for Banking"

Open Banking Strategy

Analysis By: Joanne Pollitt; Stessa Cohen

Definition: An open banking strategy enables banks to consume and deliver functionality from and to third parties in order to expand digital ecosystems, Strategies include business context, business

objectives, goals and strategies, strategic choices (business capabilities, people and culture, information and technology, ecosystem), principles, and measures of success, risks and issues.

Position and Adoption Speed Justification: More and more banks are exploring open banking strategies in 2019. Until recently, the industry has been primarily focused on adopting open banking technology (such as full life cycle API management software), rather than creating a comprehensive open banking strategy. As governments observe new regulations being introduced in other regions, they are following suit and defining new frameworks and standards that promote open banking (PSD2 in Europe, the U.K. Open Banking Standard, Society 5.0 in Japan, and so on). Banks such as Starling Bank have created a marketplace that supports both consumer and SMB customers. Many other banks have created developer portals that enable third parties to access APIs to create services. These include DBS (Singapore), Credit Agricole (France), Citibank (U.S.), HSBC (U.K.), Commonwealth Bank of Australia, Deutsche Bank (Germany) Wells Fargo (U.S.), Santander (U.K.), Swedbank (Sweden) and HDFC Bank (India).

Recognizing the impact of disintermediation and regulatory changes, executives are looking to their CIOs for guidance on how to leverage technology to address these challenges. In response, IT leaders have begun to explore open banking strategies in partnership with the business, though progress remains slow. The benefit of engaging with business partners is that CIOs will build something that not only complies with new legal frameworks and standards, but enables innovation and opportunities to gain market traction and improve net profits. The creation of a well-defined and well-articulated open banking strategy will take two to five years to reach the Plateau of Productivity.

User Advice: CIOs that focus solely on compliance are in a race to the bottom, and will miss the opportunities open banking creates. Instead, CIOs should create an executive strategy team composed of risk, compliance, marketing, IT and line-of-business leaders responsible for developing and articulating an open banking business strategy by:

- Identifying the business context. An example could be: Platform business will reduce banks to invisible, back-end utility service providers unless banks change their business strategies. A do-nothing strategy is not a viable option for our bank.
- Defining the business objectives, goals and strategies. An example could be: Today, our bank competes and wins by providing higher-quality products and protecting data, algorithms and transactions. In the future, we will compete and win by providing higher-quality tools (that is, product leadership through digital platforms) and by sharing data, algorithms and transactions. Our goal is to create a new line item on our income statement that will generate 5% of total revenue by 2022.
- Identifying strategic choices. These include business capabilities (such as identifying and recruiting business ecosystem partners), people and culture (such as hiring talent with experience building and supporting APIs), information and technology (such as building a digital platform), and business ecosystems (such as turning competitors into customers).
- Creating strategic principles. An example of a business principle could be: We will empower business ecosystems to create new value and better experiences for our customers. An

example of an information and technology principle could be: We will expose business services so that they can be shared both internally and externally.

- Identifying measures of success. An example of a business measure could be the conversion rate of customers to business ecosystem partners. An example of an information and technology measure could be the percentage of SLAs met.
- Identifying risks and issues. An example could be culture risk. Open banking represents a radical, all-encompassing cultural shift for our bank. Instead of controlling value creation, delivery and IP, we will empower and share this with others. This will require a culture that is focused on speed, continuous learning, and failing fast to win big.

Business Impact: CIOs will fail to deliver digital transformation without an open banking strategy. A business strategy for open banking will help CIOs and senior business executives align open banking strategies with digital banking initiatives, enterprise architectures, infrastructures and operations innovation. An open banking strategy is essential to create the platforms, marketplaces, app stores, and ecosystems necessary to create new value and revenue for the bank.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Recommended Reading: "How to Build an Open Bank"

"Toolkit: A Business Strategy for Open Banking"

Social Messaging Payment App Wallet

Analysis By: Christophe Uzureau

Definition: A social messaging app payment wallet relies on an instant messaging platform to originate payment transactions. The provider's core business is social messaging app services. The messaging app interface is therefore used to register payment accounts and to initiate and monitor related transactional activity.

Position and Adoption Speed Justification: The development of social messaging app wallets is most pronounced in APAC thanks to WeChat Wallet in China and abroad to support Chinese tourists as well as to LINE Pay in Japan, Taiwan and South East Asia. Acceptance by small to midsize businesses (SMBs) and use of QR code payment systems by customers has been a strong driver for social messaging app wallets. WeChat Pay continues to build global acceptance benefiting from a strong brand in the Chinese market.

WhatsApp is also building up its payment operations in India, where its messaging service has an estimated 300 million users — by taking advantage of the Unified Payment Interface (UPI). — it has been testing payment coupled with WhatsApp with 1 million users. However, it will face strong competition from established players such as Paytm and fast growing Google Pay

Now Facebook has selected the U.K. to continue building payment functionalities for its WhatsApp messaging service. Facebook is also developing its own digital currency, the Facebook coin, allegedly using a blockchain solution and issued as a stablecoin. One of the possible intents is the creation of a settlement currency to support P2P transfers interfaced by WhatsApp, Facebook Messenger and Instagram services. The cover of a P2P payment system could create an entry point for using the tokens in order to nudge customers to Facebook ecosystem. Offering discounts on transfers, or by advertising certain providers (Facebook ad clients) would increase the use of Facebook coins for certain remittance corridors.

Adoption varies greatly per country, depending on existing local market payment habits and reliance on social messaging apps in the first place; as a result, social messaging app wallet may never reach maturity in certain countries. It will therefore be difficult to replicate the success that Alipay and WeChat Pay experienced in their domestic Chinese market. Adoption may also be slowed by privacy requirements and customer's distrust with sharing personal account details with some social messaging app such as WhatsApp (owned by Facebook).

Considering these announcements as well as potential challenges, this profile has now reached the post-trough 5% stage.

User Advice: Digital leaders and CIOs of banks should:

- Use web APIs as a delivery channel for social messaging apps in order to expand the addressable market share for your P2P payment solutions.
- Use social messaging app wallets to reach both new retail customers and SMBs by using such solutions as new channels for information collection to support risk management as well as loan origination. This would also demand strong cross-line-of-business collaboration inside your organization.

Business Impact: The business impact is high, but with geographic variations. The impact is very high in APAC due to the high reliance on digital commerce for day-to-day consumption in China and the growing reliance on digital commerce such as in South East Asia, but much lower outside of APAC.

Overall, social messaging apps are becoming important intermediaries for marketing and distributing products and services due to their access to contextual information. As a result, their impact extends to lending as well as investments.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Facebook; KakaoTalk; LINE; Snapchat; Tencent Holdings

Recommended Reading: "Digital Banking Customers Expect Their Banks to Take On New Roles"

"Digital Payments Challenge Customers' Trust in Banks"

Climbing the Slope

Bank Matching Platform Model

Analysis By: Stessa Cohen

Definition: A digital business platform enables people, businesses and devices to create value in new ways, both inside and outside the bank. Gartner defines four new business model types that flow from adopting digital business platforms: collaborating, orchestrating, creating and matching. A matching platform is a style that enables the bank to match supply with demand or providers with customers.

Position and Adoption Speed Justification: Platforms expose existing enterprise assets like algorithms, data, resources and analytics. Adoption of a matching platform requires that the bank have an open banking strategy in place. It also requires the CIO to gain buy-in from relevant senior executives and other stakeholders to create a platform that could require the highest degree of openness. That is, to be successful, the matching platform typically be open to known and unknown customers, suppliers and partners. The platform must allow participation from external (and internal) providers, suppliers and customers. The ability to include as many participants as possible will enable the platform to leverage the network effect to continue to create value. Like other platform models, the matching platform leverages open banking technologies, such as APIs. This platform can also include an API developer portal or marketplace. APIs enable the bank to expose enterprise assets and selected functionality of their internal systems to their existing and new customers and business partners to enable monetization of bank's core competencies in technology, data, algorithms, security and other back-end services. Matching platforms are positioned post-trough 25%. While a few banks and third-party providers have created matching platforms, most have not yet pursued this platform model. Examples include: Matchi (acquired by KPMG), HSBC, Citizens Financial Group. While this platform style has the potential to disrupt markets by providing an opportunity for monetization for both the creators and the bank, many banks are yet to realize this. Bank CIOs can adopt these technologies from providers outside of banking and adapt them for banking purposes.

User Advice: Determine whether the bank is ready to create new business models via a public digital platform by identifying whether senior bank executives and senior IT and business stakeholders are on board with pursuing a platform that exposes the bank's data and algorithms, to known and unknown participants.

Start a matching platform model by creating a matching internal platform and plan to extend it as the bank gains confidence regarding risk, compliance and security.

Leverage the matching platform model to create new relationships and value with and for customers, partners and suppliers.

Business Impact: Matching platforms create new value by facilitating multiple supply streams at the same time. They can also enable a bank (or nonbank) to build trust and relationships before bringing financial services to the participants. Because they rely on the ability to invite new

participants to the platform, this type of platform is best suited for banks that are focused on digital transformation. The financial benefits of this style result from enabling relationships and transactions among platform participants. Thus, this platform model is suited for those banks pursuing the vision of the bank as a platform. Bank CIOs that have coherent open banking strategies can leverage the matching platform to create a competitive advantage for bank outside the traditional realm of products and services. CIOs must be aware that nonbanks or fintechs can use a matching platform to create a disruptive service. For example, peer-to-peer platforms such as Funding Circle and LendingClub are matching platforms that have disrupted the lending markets. TransferWise and Currencycloud provide matching platforms for disrupting payments as well as the invoicing process.

Benefit Rating: Transformational

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

Sample Vendors: Currencycloud; Q2 (Cloud Lending)

Recommended Reading: "Industry Vision: Open Banking"

"Bank CIOs: Seek Inspiration and Evaluate Options Before You Deploy an Open Banking Strategy"

"2019 CIO Agenda: A Financial Services Perspective"

"The Economics of Connections for Banking"

Biometric Mobile Banking Authentication

Analysis By: Alistair Newton

Definition: Biometric mobile banking authentication is the use of biometric technology to authenticate customers accessing mobile banking or payment applications on smartphones and tablets. It includes solutions that use technologies integrated by the likes of Apple and Samsung in their smartphones and tablets, as well face, voice and other modes implemented in software.

Position and Adoption Speed Justification: The positioning for this technology has not changed significantly from last year, but progress in adoption and use is still being made. Increasingly, banks that view themselves as truly "digital" are embracing this technology, however it is far from ubiquitous across all banks. The plethora of solutions now available from various smartphone manufacturers has proved catalytic in the acceptance of biometric customer authentication by both banks and their customers. Equally, from Gartner-consumer-facing research, (Gartner's Consumer Trust Survey 2019) it is clear that customer acceptance of biometric customer authentication can be influenced by the actions of national governments. In addition, the increasing number of banks (lead by many digital-only banks) using biometric technologies to help them onboard customers to the bank, as well as to provide ongoing customer authentication capabilities, has helped stimulate interest in more customers.

Now the desire by banks to be less reliant on the mobile hardware providers for such biometric solutions, to provide themselves more control over enrolment, sensitivity and configuration is leading to a greater interest in software solutions using face, voice and other modes. According to Gartner consumer surveys, consumer acceptance of such authentication systems is increasing year over year. Banks' ability to explain the concepts of biometric authentication more succinctly and positively in those markets where consumer confidence lags will be key to more aggressive deployments.

User Advice: Historically customer authentication was simply a means to an end. However, the way in which a customer is authenticated is now starting to differentiate a bank's business and customer experience. Increasingly for banks, lagging in this authentication space implies lagging in the race to digitalization.

Gartner recommends that banks develop world-class capabilities in the arena of mobile customer authentication, and specifically in biometric authentication. If not currently planning to deploy, then track the capabilities that are currently in the market and build scenarios to outline the impact on your customers' experiences. Highlight the potential that such strong authentication brings for fundamental changes to underlying business processes or business rationale for many of your bank's mobile applications. Consider the option of including the capture of customer biometric data as part of the onboarding process for new customers, as this is the most opportune moment to capture this data.

Banks must also make decisions on whether they use a single mode (voice, face and so on) or a mix of two or more. Increasingly, multiple forms may be required to match and suit individual customer contexts and preferences. Equally, they must assess the risks and benefits of on-device versus server-side data storage, comparison and matching, balancing usability with security.

Recognize that despite progress, many customers remain cautious over using biometric authentication to access their banking products. However, sympathetic and intuitive deployment of biometric authentication provides opportunities to show customers that you are actively protecting them, and this can lead to significant increases in levels of customer trust in your organization. Continue to offer appropriate advice and reassurances over alternative options to access their accounts should — for whatever reason, real or perceived — the biometric solutions fail to allow customers access to their accounts.

Business Impact: Within the digital banking space, the role of customer authentication in differentiating the product and service propositions of the bank has been somewhat overlooked by many institutions. Banks also need to heed Gartner customer research that highlights higher levels of trust by consumers in banks that provide bank-owned biometric authentication when compared to banks that rely on solutions provided directly by mobile device manufacturers like Apple or Samsung.

In many more mature financial services markets, customers still have very high levels of trust in banks to keep their data safe and secure. In more developing markets like China, banks are fighting neck and neck with the new digital entrants, like Tencent and Alibaba Group, for customer trust. Investing in biometric customer authentication technology can help banks develop deeper levels of

customer trust — having to explain to slightly skeptical or less-informed customers about the benefits of strong biometric authentication, and explain how it will be used responsibly to protect them and make their interactions more seamless, can actually form the basis for deeper, more constructive customer relationships in the future. Banks should not shy away from these seemingly "tough" conversations and technologists need to understand these nonmonetary value ads that the technology can bring to bear.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Recommended Reading: "Biometric Customer Authentication: Love, Hate and Ambivalence in Equal Measures"

"What You Must Know About Identity and Access Management in 100 Tweets"

Biometric Authentication Methods

Analysis By: Ant Allan

Definition: Biometric authentication methods use unique biological or behavioral traits to corroborate a person's claim to an identity previously established to enable access to an electronic or digital asset. A biometric authentication method is typically used in one-to-one comparison mode (biometric verification), to support an implicit or explicit identity claim. Rarely, a method is used in one-to-many search mode (biometric identification): the person simply presents a biometric trait and the system determines the identity from a range of candidates.

Position and Adoption Speed Justification: Biometric methods are increasingly used across a variety of use cases, especially in mobile banking and, more recently, in enterprises rolling out Windows 10 with Hello for Business. Drivers for adoption are improved user or customer experience (UX/CX) and increased trust and accountability. However, concerns about privacy and presentation attacks inhibit forward movement and may create disillusionment with these technologies.

While usability and reliability issues with fingerprint modes inhibit enterprise adoption and color buyers' attitudes toward all modes, client interest has piqued due to Microsoft's support for face and other modes in Windows Hello for Business.

Vendors increasingly support Fast IDentity Online (FIDO) authentication protocols that can simplify implementation (among other benefits). W3C WebAuthentication browser support for FIDO2 will likely speed up adoption and increase penetration over the next two years.

Clients' privacy concerns tend to focus on data security issues, but the main hurdle is privacy regulations' demand to be able to justify the use of biometric methods. Clients also worry about biometric methods' vulnerability to presentation attacks and other potential compromises.

User Advice: Biometric methods are a viable alternative or adjunct to passwords and tokens across a variety of use cases. However, trust, TCO and UX/CX vary between modes, and their viability varies depending on the use case. Biometric methods can provide greater individual accountability than alternatives and should be favored when this is paramount.

Trust is critically dependent on effective presentation attack detection (PAD) or liveness testing. Carefully evaluate vendor claims and favor methods tested in conformance with ISO/IEC 30107-3:2017.

Most modes can provide better UX/CX for most people than nonbiometric alternatives, and this benefit is particularly relevant to mobile use cases. Banks commonly integrate device-native modes in mobile banking apps, but third-party face and voice are emerging as the modes of choice. Favor modes that can make use of standard inputs (camera and microphone) and offer multiple benefits over device-native methods.

Consider migrating to biometric authentication for Windows PC and network access, but recognize the limitations of Hello for Business (e.g., biometric methods cannot be mandated). Evaluate vendors that offer broader endpoint and use-case support and choice of biometric modes, including those that combine biometric modes with phone-as-a-token methods for passwordless two-factor authentication. Such mobile-centric biometric methods potentially provide more consistent UX, regardless of the endpoint device being used, than integrating biometric methods directly with each endpoint device.

Weigh the pros and cons of local versus centralized biometric data storage, comparing and matching. Favor centralized architectures to more readily support multiple digital (and other) channels and devices and, especially in banking, to exploit biometric data captured during identity proofing.

Architectures differ in privacy-relevant data security concerns, but the architectural choices cannot avoid general regulatory requirements set out in the EU General Data Protection Regulation (GDPR) and similar privacy mandates.

Business Impact: Biometric methods with effective PAD can provide improved UX/CX for most people, as well as increased trust and accountability (because biometric traits cannot easily be shared).

Biometric methods suit mobile use cases, where users — especially retail customers — resist having to use any kind of discrete token. Biometric methods may be integrated within mobile apps (as they are in mobile banking), apps for mobile push authentication and so on.

Biometric methods can be used for PC and network login. Proprietary solutions offer broader endpoint and use case support and choice of biometric modes and thus provide more value than device-native biometric methods, including those supported by Hello for Business.

In addition to the methods represented by this profile, passive behavioral modes (keyboard, gesture and handling dynamics) can provide postlogin “continuous authentication.” But rather than thinking of these as an alternative to orthodox, credential-based authentication methods, these are best

treated as additional familiarity signals that can add significant value to analytics-based tools, including online fraud detection (OFD) tools, elevating trust and improving UX/CX by reducing false positives (i.e., bogus fraud alerts). In this context, these modes can also provide bot detection.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Aware; BIO-key; Daon; FacePhi; HYPR; Nuance; OneVisage; Sensory; Veridium; ZOLOZ

Recommended Reading: "Best Practices for Selecting New User Authentication Methods"

"Technology Insight for Biometric Authentication"

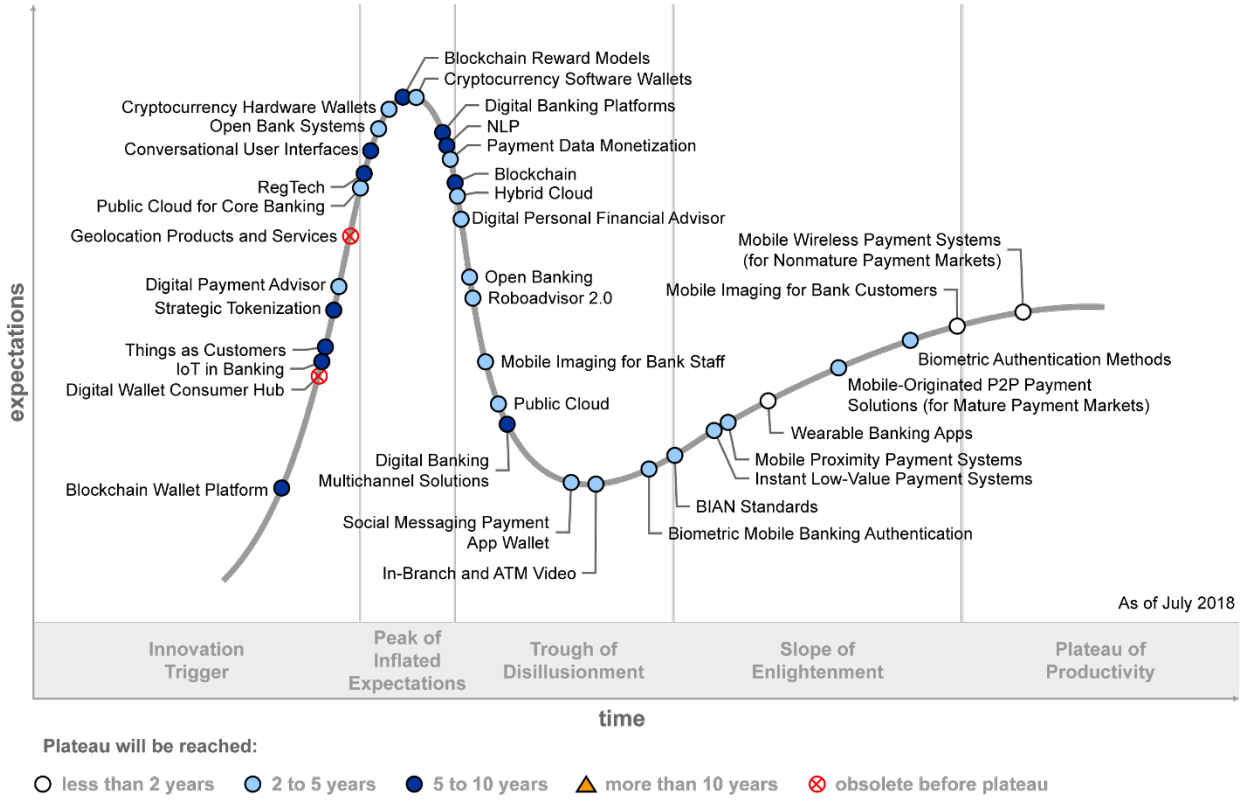
"Technology Insight for Phone-as-a-Token Authentication"

"Market Guide for User Authentication"

"Predicts 2019: Identity and Access Management"

Appendixes

Figure 3. Hype Cycle for Digital Banking Transformation, 2018



Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 1. Hype Cycle Phases

Phase	Definition
Innovation Trigger	A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.
Peak of Inflated Expectations	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.
Trough of Disillusionment	Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
Slope of Enlightenment	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
Plateau of Productivity	The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
Years to Mainstream Adoption	The time required for the technology to reach the Plateau of Productivity.

Source: Gartner (July 2019)

Table 2. Benefit Ratings

Benefit Rating	Definition
Transformational	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
High	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
Moderate	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
Low	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2019)

Table 3. Maturity Levels

Maturity Level	Status	Products/Vendors
Embryonic	■ In labs	■ None
Emerging	■ Commercialization by vendors ■ Pilots and deployments by industry leaders	■ First generation ■ High price ■ Much customization
Adolescent	■ Maturing technology capabilities and process understanding ■ Uptake beyond early adopters	■ Second generation ■ Less customization
Early mainstream	■ Proven technology ■ Vendors, technology and adoption rapidly evolving	■ Third generation ■ More out of box ■ Methodologies
Mature mainstream	■ Robust technology ■ Not much evolution in vendors or technology	■ Several dominant vendors
Legacy	■ Not appropriate for new developments ■ Cost of migration constrains replacement	■ Maintenance revenue focus
Obsolete	■ Rarely used	■ Used/resale market only

Source: Gartner (July 2019)

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Understanding Gartner's Hype Cycles"

"Gartner's Digital Banking Taxonomy 3.0 — How to Focus Your Transformation Efforts"

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