RESEARCH NOTE

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2017 OUTLOOK: EMERGING TECHNOLOGIES

Three new technologies are vital for payments.

Three technologies need to be embraced immediately by the payments industry. They are tokenization, machine learning, and APIs. These three are important to consider when making any investment plans in specific strategic areas. Three more technologies will most likely affect the future of your organization but do not, broadly speaking, need immediate implementation—unless your institution is ready to invest in them now. They are biometrics (eliminate passwords), mobile OS and blockchain.

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Introduction

At the end of every year Mercator Advisory Group publishes its Outlooks on the payments industry for the next year. This year the Emerging Technologies Advisory Service reviews and updates our predictions from last year. Table 1 is a list of the predictions we made for 2016 and an appraisal of their accuracy.

Table 1: Reviewing 2015 Predictions Made by Mercator Advisory Group for 2016

Technology	2016 Prediction	20/20 Hindsight	
Biometrics	Mobile app and call center focused	More mobile banking apps added support for biometrics and implemented a wider range of biometrics, but adoption across bank channels was less than expected.	Close
Wearables	Mobile pay	Most new wearables are payment enabled, but the wearables market is slow to develop.	Close
BLE / in-store communications	Pilots and experiments in-store continue.	Very few new merchant announcements or pilot extensions. A candle in the wind?	Missed
Cloud / machine learning	Large financial institutions (FIs) and ISVs pilot.	Networks announce machine learning-based fraud management and deployment in noncore solutions, such as customer relationship management (CRM)/analytics, are on the rise.	Spot on
Mobile OS design point / m-POS	Adopted by midsize merchants and large financial institutions.	Wide-scale m-POS deployments have not yet happened, very large merchants have put m-POS on the top of their architectural plans, and the use of mobile OS for other purposes has accelerated.	Close
Platforms and payment APIs	Uber, Apple, WePay, and others expand via APIs.	Banks, merchants, processors, and acquirers have been rushing to deploy development sites on the web. Regulation has started earlier than predicted.	Spot on
Cloud / tokenization	Use of host card emulation (HCE) in Android bank apps expands and browser pilots are tested.	Many more banks have deployed and browser-based solutions were announced, but Chrome and Safari not available until 2017. 3-D Secure V2 will further speed adoption.	Spot on
Private blockchain	Large FIs pilot (R3 and Azure).	Pilots announced at a frequency that makes tracking difficult. Ripple is likely the only product ready for the regulated payment market in 2017.	Spot on

Source: Mercator Advisory Group

Recognizing that actual implementations varied to different degrees from what we forecast, Table 2 introduces our revised and prioritized forecast for 2017.

Table 2: Mercator Advisory Group's Emerging Technology Predictions for 2017 and Beyond

	Technology	2017	2018–2020	2021 +
1.	Tokenization	More mobile devices with payments and in browsers. 3-D Secure V2 starts consolidation.	3-D Secure actively deployed, Apple enables bank app payments and network tokens appear in browsers for payments.	Browser and Internet of things (IoT) usage makes it clear that online banking must provide new credential management.
2.	Cloud / machine learning	Deployments continue internally to reduce costs, in ISV solutions, and to enable consumer interaction.	Sophistication of machine learning grows rapidly, targets more specific operations, and is applied more broadly. Amazon Go store concept can be evaluated.	Upheaval. Changes all customer interactions and engagement. Used for most back-end cost-containment efforts.
3.	Platforms and payment APIs	Banks increasingly partner via APIs and more web development sites become available and more capable.	Adoption by high-volume and online businesses creates challenges for midsize and small FIs.	Platforms are a common mechanism for partnering, employment, and payment.
4.	Biometrics	FI delivers password alternatives unevenly across channels. Shifting architecture jeopardizes ROI.	Two architectures vie for dominance: smartphone-based solutions and cloud-based centralized solutions.	Race is on to use biometrics to replace passwords as much as practical.
5.	Mobile OS design point / m-POS	Growth of m-POS slow but steady, but mobile OS continues growth into new form factors, including ATM and teller operations.	At least one national merchant begins m-POS deployment and FI solutions increase. Mobile OS is the center of consumer engagement.	Mobile OS capabilities are utilized broadly in complex consumer-facing applications and environments.
6.	Blockchain	Large FIs continue pilots; consortia announced. Ripple and others gain traction. Deployed primarily in non-regulated markets.	Consortia, nonprofit organizations, and government deploy solutions. Simple ledger implementation becomes primary blockchain model.	Cloud and blockchain become hard to differentiate.

Source: Mercator

Readers familiar with last year's predictions will notice that the list has been whittled down to six technologies from the original eight, with Bluetooth low energy (BLE) and wearables now missing from the list for 2017. In our self-evaluation of 2016 prediction results shown in Table 1, we identified that the forecast for wearables was "close" and the forecast for BLE was entirely "missed." Removal isn't an act of spite; in reviewing these two technologies and adoption patterns we simply believe that they no longer deserve to be on the short list of technologies to watch, especially not when the top four technologies are approaching at a rapid pace and are likely to reshape entire markets. If and when suppliers of wearables add a broader range of sensors that enable the wearables to incorporate a greater range of applications well beyond health, fitness, and basic payments, then we will reconsider the technology for inclusion. Regarding BLE, we will reconsider that technology if we see broader adoption specific to shopping or a solution that applies BLE to payments that delivers real value.

Three Technologies that Demand Immediate Attention

This Outlook identifies six technologies that will have an impact on payments over the next five years, but some will hit sooner and have a larger impact than others. So discussed first below are the three that should be on your to-do list right away.

Tokenization

E-commerce and m-commerce will continue to grow substantially faster than traditional commerce and new technologies (including more Internet of things, or IoT, devices). New competitors and new potential partners will continue to appear at a breathtaking rate. Tokenization will prove critical to participation in these new markets. Tokens will be used to enable everything from payments embedded in mobile apps and browsers, to ATM withdrawals arranged through chatbots, Alexa, or Google Assistant. In or about 2018, 3-D Secure will begin to drive consolidation of e-commerce and m-commerce payments. This standard will collect more information regarding the customer and the device to the network and will enable tokenization of the device where the device has the appropriate intelligence and security, as will be the case for Chrome and Safari. This broader deployment of payment credentials will drive awareness that online banking tools need to be improved to support the breadth of new tokens being deployed, which will have limits that range from specific stores, specific dollar value, and date ranges.

Prior to broad adoption of 3-D Secure V2, the networks will continue to apply machine learning tools to manage fraud and will require that merchants provide additional data regarding customer transactions to feed those tools. This was a core benefit Visa derived from the acquisition of Cardinal Commerce. With online fraud increasing dramatically due to in-store adoption of EMV thwarting counterfeit card fraud, the new 3-D Secure standard will see rapid adoption by merchants in 2018 and beyond as long as online shoppers' cart abandonment rates remain low. Issuers need to be prepared to manage the additional signals that the merchants will put into the authorization transaction, and merchants need to implement the 3-D Secure server that integrates to the network Directory Server and the acquirer. Mercator Advisory Group recommends that issuers and merchant start becoming knowledgeable about 3-D Secure right away and start planning to deploy it.

Machine Learning

You might think that this is about Alexa, Amazon Go, Google Now, Microsoft Home Hub, or any of several machine learning products announced by Ford, Tesla, Facebook, Samsung, Disney, and a broad range of other innovators. And yes, you should be considering all of these new potential customer channel partners as you plan, although only the largest banks can actively play in this space today. For most financial institutions (FIs), integration into these artificial intelligence products will be done through partners—your processor, core system supplier, or even

your call desk supplier. So yes, ask your suppliers what they will do to help your customers engage with these new products. But you should also be asking yourself where your own operations can utilize machine learning tools to improve customer engagement and satisfaction, increase sales, or reduce costs. Machine learning has become very inexpensive, available, and practical, so don't sit this one out! Build up expertise immediately within your IT organization and business planning group and aggressively look for low hanging fruit—the payback can be large and attained quickly.

APIs

Businesses with a large customer base can establish themselves as a market maker by creating a developers' website that includes a sandbox for potential partners. Amazon, Apple, Capital One, First Data, PayPal, TransFirst, Vantiv, and Wells Fargo, to name a few, have deployed developer websites. Small, innovative development shops that believe they can add value to the customers of these giants will integrate their solutions with the development sandbox to demonstrate that value, shifting the partnership effort from a hunting expedition to a beauty contest. Smaller FIs should consider the value-added services that would make sense for their organizations and their customers that are available from trusted partners as application programming interfaces. Scheduling bank appointments online? There's an app for that. Want to enable customers to notify you when they intend to travel? There's an app for that too. Investigate the APIs that your existing partners have available that can add value, and then expand the search. New features can be added faster and more easily than ever before. This is not to say that no work is required, but there are more opportunities than ever before and leveraging those opportunities is easier than ever before.

Then there is the question, does your institution need to have a developer site? If you intend to support business users that are conducting business over the Internet, especially platform-based Internet companies, or if you have a large account that is particularly important to you, then you should likely consider deployment of a developer website.

Three Technologies Most Likely To Impact Your Current Planning

Three technologies that are most likely to affect the future of your organization do not, broadly speaking, need immediate implementation plans—unless your institution is ready to invest in them now. If your institution is preparing to increase its online security, make sure you understand how biometrics will affect the security market over the next three years. Investing in the wrong technology would be very expensive. If preparing to roll out new teller terminals, ATMs, or other consumer-facing systems, make sure you study the impact that mobile devices are having on these systems, or you could make an expensive mistake. If you intend to implement a new collaboration with partners, be sure to evaluate blockchain technology and cloud computing before making the investment. Here is a quick review of each.

Biometrics / Eliminate Passwords

We learn of a new breach that has released consumers' personally identifiable information, including passwords, on a weekly, if not daily basis. Device fingerprinting helps but isn't a panacea, and password resets are more expensive than many think. Consumers are adopting their smartphone fingerprint readers faster than many industry observers predicted, and USAA has found broad adoption of its biometric solutions across all of its channels. Wells Fargo has enabled authentication of customers in its branches using smartphones, and the payment networks have all announced biometric pilots. But over the next five years, major architectural shifts are likely to occur in the authentication market.

Multimodal persistent identity that includes behavioral biometrics will reduce consumer friction while improving authentication, but it will also shift the authentication process from being deterministic (pass/fail) to probabilistic (99.8% probable). Key drivers of this change and many others are the mobile device operating system manufacturers. Google is testing the Abacus project with several banks; Abacus combines the mobile OS, sensors, GPS, cloud, and machine learning to authenticate the user. As described in the Mercator Advisory Group Viewpoint *Will Google Make Current Biometric Approaches Obsolete?*, released in November, Abacus collects a wide range of data from the handset to establish a trust factor, including always-on voice recognition, location coordinated with time of day, the way the phone is held, the way the user swipes the phone, and face recognition when the user looks at the phone. This wide range of user attributes and information is analyzed to formulate a trust factor associated with the person holding the device.

This transition to risk-based authentication will prove difficult but critical. It reduces customer friction for low-risk activities and better reflects the reality of authentication technology which, as we know from experience, was never truly definitive.

Flying in the face of this reality is the European Union, which has issued a draft standard that requires multifactor authentication even for low-value payments. This would necessitate an active user-authentication step for all financial transactions no matter how small, adding significant payment friction for little or no value. Visa and others are fighting this requirement tooth and nail because of the expectation that it will cause consumers' abandonment rates to skyrocket and perhaps even drive a return to cash. Regardless of what happens in Europe, however, risk-based authentication must be considered when preparing to invest in new authentication technology.

Of course a mobile authentication technique may not be appropriate for all channels for all banks, so a transition strategy is required. For those institutions that do not wish to force their customers to utilize a smartphone for every channel, the alternatives are to stay with passwords and device fingerprinting or to implement centralized biometric solutions such as voice biometrics for the call center, palm-print biometrics for retail, etc.

The problem of course is that current authentication techniques are not long-term solutions, since ultimately the mobile device will win out and these solutions establish a honeypot that attracts criminals. So if evaluating a biometrics solution, be sure that the biometric template is stored separately from all personally identifiable information utilizing tokens for access and that the templates are fragmented and encrypted. There are cloud solutions available that will perform this function for the institution.

Mobile OS

The mobile OS will become the de facto operating system in every consumer-facing solution over the next 10 to 15 years. It is the operating system that youth know, it connects seamlessly to other mobile devices and to the cloud, its security and power improves every year, and mass manufacturing and automatic software updates make the ROI irresistible. Mercator Advisory Group first predicted this January 2015 in a research report titled *M-POS: Expanding the Payments Value Chain into New Territories*.

The smartphone has already become the new way of interacting and doing business with financial institutions. From remote deposit capture, photo bill pay, conferencing for support, to mobile payments, consumers are increasingly adopting financial solutions that are mobile centric.

The wide range of sensors built into the mobile device represents a critical capability that no other computing platform has yet been able to duplicate. Combined with cloud connectivity, the mobile platform becomes aware of the consumer's situation. Last year we predicted that these mobile devices would become highly context sensitive in 2017, and indeed Google Now tells us when to leave for an appointment and where our car is parked. Google Assistant is the key differentiator to the Google Pixel smartphone, and this capability is now embedded into home devices such as Alexa and Google Home. The range of apps that support contextual awareness will grow in numbers and sophistication every year going forward. So we stick by our forecast made last year that by 2020 applications that are not contextually aware will be singled out by consumers as inadequate.

Blockchain

Hold on to your hats for two observations that may initially appear contradictory. Mercator recently published the Viewpoint titled *10 Reasons To Be Skeptical That Blockchain Will Disrupt Financial Services Any Time Soon.* In it we argue that blockchain solutions currently lack the features required to achieve regulatory compliance in the payments space. This opinion is backed by the research project Mercator performed for TMG and CO-OP Financial Services and made available online.[i] In evaluating three blockchain solutions, Mercator discovered key problems that would require years of restructuring to address fundamental regulatory problems or, in one case, bypassed those hurdles by not implementing a blockchain at all (despite being marketed as a blockchain solution).

However, during that research effort we observed that one blockchain solution, from Ripple Labs, has gone through six years of product and organizational restructuring and is now close to achieving a compliant implementation, as we described in the Mercator blog titled *CEO Steps Down Just as Ripple Labs Is Ready for Liftoff*. Others solution providers, including Circle, claim to have also solved these structural problems, but Mercator has not performed an evaluation on any providers beyond the original three performed for the project. The research identified an approach for building a blockchain solution that is compliant, but few if any current blockchain providers are following that approach. The two key findings are these:

1. The longest road to product launch is to build a generic blockchain platform that can be applied to multiple business problems. Regulatory hurdles in payments, on a worldwide basis, are complex and sometimes contradictory. Instead, build a consortium that is focused on a single use case, make sure all aspects of that use case are properly recognized, and then build a platform to execute that specific use case. An important aspect of this is a business structure that supports the legal business structure across all participating states. When we apply this observation to R3 and Ethereum, which are attempting to build a generalized smart contracts environment, we come to the conclusion that it is likely to take several years before anyone is ready for a full product launch in nonregulated markets and much longer than that in regulated markets.

2. The term "blockchain" is no longer descriptive of anything specific. Microsoft and IBM describe cloud-based blockchain solutions that support multiple entities on a single node, eliminating the distributed database structure that was initially the primary element of blockchain. This reinforces Mercator's belief that only 10% of blockchain solutions offered today belong on a blockchain. Most of these solutions can be more easily and cost effectively deployed in the cloud utilizing nothing more than an immutable ledger or even a traditional database. The term blockchain opened everyone's eyes to what can be achieved through collaboration on a single platform, but there are multiple technologies that can achieve that vision.

Conclusion

Tokenization and 3-D Secure V2, combined with the battle for m-commerce and e-commerce dominance, as well as the rapidly approaching impact of the Internet of things, will require immediate attention from most participants in the payments value chain. Machine learning has reached a level of maturity that could never have been predicted just three years ago. The capability is amazing and the cost so low it can only be described as a commodity. Organizations that fail to invest in machine learning to lower costs and better engage customers will find themselves falling behind those competitors that do. Regarding APIs, developing a strategy to either deploy a

development website or integrate to new solutions that add value to your products and services should also be on the top of your list of priorities for 2017.

Biometric authentication, mobile OS, and blockchain will be important to consider if in 2017 your organization invests in these associated business areas. When beefing up your authentication tools for consumers, commercial relationships, or internal employees, make sure you understand the landscape of biometrics and how it may shift over the next few years. If deploying consumer-facing systems, make sure you consider utilizing mobile devices. While they may not yet have the power and security your organization requires, some very well might, and the mobile cost structure costs significantly less. Lastly, if you expect to execute a partnership with multiple other institutions in nonregulated areas in the short term, consider how blockchain might apply, but don't be blind to a more traditional cloud solution. If implementing a collaborative effort in regulated markets, be sure to look to the cloud.

Endnote

[i] http://www.cutoday.info/Fresh-Today/2-New-Blockchain-Resources-Released-By-CO-OP-TMG-Mercator

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