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## 2020 OUTLOOK: EMERGING TECHNOLOGIES TRENDS IN THE U.S.

Technology is shifting consumer behavior so fast that financial institutions and payments processors and networks are hard pressed to keep up.

*It once took years for technology to alter markets and shift consumer behavior. Today those changes are happening more rapidly than ever before, and it's unlikely that many processors, networks, or financial institutions are taking the shift as seriously as they should. Identity has emerged as the central issue for payments and account opening, but with the technology evolving so quickly, there are no benchmarks available to compare offerings and so determining appropriate solutions is difficult.*

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## A Review of 2019

In November 2018, Mercator Advisory Group published *2019 Outlook: Emerging Technologies Trends in the U.S.*, (see References for hyperlinks to works cited in the present text.) In that document, Mercator's Emerging Technologies practice identified machine learning, application programming interfaces (APIs), and cloud computing, authentication, tokenization, digital payments, and two different blockchain implementations as technologies that would impact the payments industry in 2019. All did indeed have a significant impact, although we did not specifically predict that Facebook's proposal of a cryptocurrency would rile the payments industry the way that it did.

Machine learning's footprint continues to expand across all aspects of business and suppliers, including the payment networks, each of which is trying hard to leverage the artificial intelligence network effect so that its implementation becomes the most effective machine learning model, trained on the largest possible dataset. Other companies have developed machine learning platforms that are more aligned with traditional information technology to enable a broader IT audience to participate in the development of innovative new solutions.

While application programming interfaces and the European Union's Open Banking construct have met delays as standards bodies continue to refine specific use cases and implementation details, the API landscape in the United States has advanced rapidly, albeit as a hodgepodge. APIs in the U.S. are used by banks to integrate to third-party partners and corporate clients. The lack of a mandatory implementation standard appears to have enabled innovation in the market, which as a result has expanded rapidly to solve new use cases and market needs.

More relevant to payments, multiple cloud-based payment platforms have come to market that leverage APIs to enable potential customers to test the solution in a provided developer sandbox environment before going live. This greatly expands access to the payments infrastructure for startups and enables innovative payment solutions to come to market much faster. As will be discussed, speed to market can be a blessing and a curse.

E-commerce related criminal activity continues to drive interest in identity, authentication, and onboarding solutions. Synthetic identities, account takeovers, and brute force attacks continue to plague all online activities. As a result, suppliers and payment networks continue to expand their solutions to address this criminal activity, while fraud platforms continue to evolve and address new fraud vectors. Tokenization continues as the central element used by payment networks, which replace card numbers with more easily protected and managed tokens, which combine random numbers with a card number structure. These remain a central premise of the EMV Secure Remote Commerce (SRC) and EMV 3D Secure checkout standards. More interesting is the announcement that the card-based payment networks intend to utilize tokenization to gain access to accounts through other payment networks, including the Automated Clearing House, ACH.

And now, on to predicting the trends in emerging technologies that will affect U.S. payments in 2020.

## Machine Learning Gets Ahead of Itself

Machine learning platforms have become so automated that they are now capable of ingesting data and building actionable machine learning models almost automatically. As a result, machine learning has quickly penetrated almost every operational area of business. This trend will continue, and machine learning models will proliferate, especially as new models are built into platforms that make it easy to automate business processes and power voice-activated assistants. As was true in 2019, these solutions will continue to proliferate in 2020.

However, we also predict that in 2020 a significant portion of these new instant machine learning models will be discovered to be learning and instantiating past mistakes and biases that were encoded, but not directly visible, in the training data. Biases and errors buried in training data are hard to identify and require specific expertise and scrutiny to uncover.

Errors of bias have already been discovered in several machine learning models, including those that implement credit limits<sup>i</sup> and decide which prisoners should be paroled.<sup>ii</sup> But less obvious errors and biases are likely to be encoded in machine learning models simply because the provenance of the training data is assumed to be accurate and appropriate by implementers more focused on deploying a solution than evaluating where and how the training data was collected. The errors will be further exacerbated as machine learning platforms become available that automate the creation of models from existing data. Self-driving tools are likely to be fed data that is inappropriate to their purpose, biased, or contains errors, which will then instantiate the same behavior that created the training data in the new model without the developer being aware of what was done.

This risk is most easily understood by considering data that is biased through normal human behavior. Consider a model trained using existing shopping data. Because women are more frequent shoppers, any predictive model based on unedited shopping data will likely recognize and predict that women are more likely than men to purchase cooking items.<sup>iii</sup> If this prediction is used to steer customers, it will likely reduce sales, not increase them. This is similar to the trap that caught Amazon when it created a model to select who should be interviewed as candidates for hiring by evaluating submitted resumes. Because Amazon used its past hiring results to train the model, the model recognized that males were more likely to be hired than females and so the model recommended more males be interviewed over female applicants; instantiating the bias that was present within the training data.<sup>iv</sup>

In 2020 the industry will witness more unfortunate machine learning implementations that initially appeared to automate decision making properly but which ultimately simply made the same bad decisions faster. As a result, Mercator expects new guidelines will be developed for vetting training data, new data management practices will be established that capture more metadata to assist in managing training data, and effort will be redoubled to make the decision process that is encoded in the machine learning models visible for evaluation.

## APIs, Cloud, and Platforms Deliver Speed and Diversity

Application programming interfaces and the cloud have had a material effect on the market. Traditional core processors, especially those operating multiple core platforms, are attempting to deliver a rationalized set of APIs that can be used not only by a processor's existing clients but also to capture business from new alternative banks and financial technology companies (fintechs). The cloud has spawned a wide range of payment platforms, many focused on specific markets from payroll to payouts. Traditional banks find that the market has become more competitive as venture capital flows into alt-banks and payment platforms. The banks benefitting from this trend the most are those that are able to react to the needs of these startups and wrap appropriate risk models around the solution to manage the money flows and address the concerns of their regulators. It is interesting to note that these banks are increasingly relying on machine learning platforms to quickly adapt to the needs of the fintech platforms.

As described in past Mercator Advisory Group research reports (see *Developing an Appropriate and Sustainable Business Plan for an API Portal*, released in April 2018), U.S. banks are primarily implementing external APIs to support corporate clients, and very few are following the Open Banking model required in the European Union. This scenario is likely to continue into 2020 and beyond. At the same time, APIs will be widely adopted by U.S. banks to plug into their processor's payment solutions, especially the EMVCo standard Access Control Server (ACS), which will support the payment networks' implementations of EMV 3D Secure and Secure Remote Commerce solutions. APIs will also support Zelle and perhaps the faster payment networks in late 2020, although that's an aggressive timetable.

## SRC Will Push Tokens into E-Commerce Environments

In an effort to better secure e-commerce transactions, the payment networks are implementing the EMV Secure Remote Commerce specifications, which will be aggressively promoted by the payment networks starting in 2020 (see the Mercator research report *Securing E-Commerce: Competing Technology Crowds the Market*, released in February 2019). This EMVCo standard will deliver a network-based wallet that is unique for each cardholder but contains any and all payment cards the consumer wants to use. All of the personally identifiable information (PII) and card data is held by the payment card networks, which also directly interact with the consumer device. This will deliver stronger security and authentication of the cardholder on the front end and deliver the PII and card data to the merchant using a secure communications channel on the back end. More important, unless the merchant explicitly requests the primary account number (PAN), the SRC implementation will always replace the cardholder PAN with a network token. From the merchant's perspective, this means network-defined tokens will now be entering the merchant's environment when the consumer uses a mobile wallet at the physical point of sale and increasingly also from every e-commerce transaction.

The SRC standard and (Mercator assumes) each payment network implementation will enable any card to be placed in the SRC wallet, which would also store closed loop prepaid cards and prepaid incentive cards as well as

debit cards that require a personal identification number (PIN) for transactions. Unclear is how a merchant will route a PIN debit transaction when and if it is in the SRC wallet and sent to the merchant via the SRC back end. It is likely that just as merchants and PIN debit networks had to struggle to implement PIN debit transactions using EMV, a similar struggle will likely be needed for the SRC implementation. Perhaps a battle royal awaits in 2020.

In June 2019, Visa announced the acquisition of the Rambus payments and ticketing lines of business. Rambus has already implemented tokenization on other payment networks including the ACH, and Visa has stated that it intends to use its tokenization service to enable access to ACH-based accounts:

Today, Visa offers these capabilities through Visa Token Service for card-based payments on the Visa network. Rambus' token technology will enable Visa to extend the security and convenience of tokenization to all types of transactions beyond Visa cards, including those on domestic card networks, account-based and real-time payments systems.<sup>v</sup>

It is important to note that Mastercard also intends to broaden its payment network to enable transactions well beyond its own card network based on its acquisition of Vocalink<sup>vi</sup> way back in 2016. This suggests that both Mastercard and Visa are very likely to deploy some versions of this strategy in 2020, even if only as a pilot.

## Identity and Authentication: Never Needed More, Yet Never More Confusing

We have already discussed the attempts by the payment networks to improve authentication using Secure Remote Commerce and EMV 3D Secure, but these EMVCo standards do not assist in establishing identity and although the networks may have an interest in offering authentication products to financial institutions, so far that doesn't appear to have gained any significant traction. So with synthetic fraud increasing significantly, there is a very real need to improve the way that individuals are identified online, and there is no shortage of suppliers that claim to have solved the problem. Unfortunately, there is no test available to validate the proficiency of a solution, or perhaps more important, to identify a solution's strengths and weaknesses (see the Mercator research report *Biometrics: A New Wrinkle Changes the Authentication Landscape*, released in January 2017).

Then there is the authentication dilemma. Authentication technology grew at an amazing rate in 2019 with more fingerprint sensors and facial recognition technology entering the market than ever before. At the same time as technologists claimed close to perfect "liveness" detection and improved accuracy, hacks were announced that made that technology moot if the phone could be stolen. In part these hacks may be preventable using behavioral biometrics, but again this technology has advanced so rapidly that there is no standardized method for testing how effective each solution is for different use cases and no easy way to identify attack vectors against which the solution is least likely to be effective.

So in essence 2019 has been a year of an insane cat-and-mouse game between technology suppliers and criminals. 2020 needs to be the year in which the technology suppliers recognize the need to develop standard testing methods and metrics and embrace the FIDO standard so that new technologies can be easily added to financial institutions' own technology portfolios.

2020 may also be the year when the idea and implementations of self-sovereign identity (SSI) gain additional traction. Several major suppliers, government agencies, and banks have built solutions or embraced the SSI concepts,<sup>vii</sup> and 2020 should see that adoption accelerate (see Mercator two-part report *Distributed and Self-Sovereign Identity Solutions: Part 2, Implementations and Suppliers* and *Distributed and Self-Sovereign Identity Solutions: Part 1, Technology Overview*, released in August and September 2019).

## Cryptocurrencies and Blockchain

Ripple experienced significant new adoption in 2019 and recently announced that it has more than 300 customers and experienced 10X year-over-year growth in transactions.<sup>viii</sup> In addition, MoneyGram is now using Ripple and its On-Demand Liquidity offering in two markets (Mexico and Thailand were identified by a Ripple executive), and 24 companies have signed up to use ODL so far.<sup>ix</sup>

JP Morgan Coin remains in pilot but continues to make the news as JP Morgan finds more development-related relationships such as that being tested with the Monetary Authority of Singapore (MAS). MAS is conducting Project Ubin, a multiyear effort to test blockchain and Central Bank Digital Currencies. Currently JP Morgan is involved in a test of concept platform that involves multiple currencies to support the government-owned conglomerate Temasek.

The People's Bank of China is expected to introduce a stablecoin based on the yuan very soon, perhaps by the time you read this.<sup>x</sup> One interesting aspect of this project is that nonbanks as well as banks are expected to be able to access the currency. A report in Forbes<sup>xi</sup> cited a former employee of the China Construction Bank and other sources in stating that Alibaba and Tencent, two nonbank e-commerce behemoths, as well as China UnionPay and other banks will participate, including the Industrial and Commercial Bank of China, the Bank of China, and the Agricultural Bank of China. Chinese authorities have pitched their digital currency as a response to Libra, the permissioned blockchain digital currency proposed by Facebook, which they see as a serious threat to central bank control over the economy. Other central banks, including the U.S. Federal Reserve, are considering cryptocurrency launches of their own. We expect the momentum to grow in 2020 as other large central banks seek to preserve their reserve currencies' status as global mediums of exchange. The geopolitical strategic aspect to this trend will make it a concern at the top levels of government and financial institutions.

The tests by JPMorgan Chase, taken together with the advancements made by Ripple and the activities of the People's Bank of China, indicate that cryptocurrencies are gaining credibility for use as an intermediary between multiple fiat currencies, as well as direct mediums of exchange. It would be wise to track these developments in 2020 if this is an area your firm is involved in.

Less certain is the evolution of the blockchain. Mercator recognized that an open blockchain represented a breakthrough in that the proof algorithm assured ordered transactions without duplicates and delivered a private ledger that assured transparency and privacy, but we also questioned its value when operated by a closed group of entities and when the open structure was reduced in the name of speed or control. Our hesitancy was based on the blurring of the differentiation between a reduced-function blockchain and a more traditional cloud-based database. For example, running a blockchain that mandates everyone utilize a blockchain operated by IBM, Microsoft, or Amazon makes no sense. In fact it would be less expensive and faster to implement such a solution by delivering APIs that appear to be a blockchain but are actually connected to a database designed to mimic a blockchain. It would cost less to implement, be easier to modify, operate much faster, and cost far less to deploy. Mercator made these points three years ago and waited to be proven wrong. Now more observers are coming to the same conclusion<sup>xii</sup>,<sup>xiii</sup> while a few argue blockchain is not dead yet.<sup>xiv</sup>

## The New Data Management Problem

New approaches to the ways data is managed are needed in order to prevent training data from creating erroneous and damaging machine learning models, to prepare for the European Union's General Data Protection Regulation and the California Consumer Privacy Act, and to prepare for major shifts in the way identity is managed and how payment systems will integrate to ISO 20022. The change required will not be small. It isn't simply adding a few more metadata tags. Rather, solving the data management problem demands rethinking how to document the data that is collected and stored. Consumers have the right to be forgotten. The data used to train machine learning models needs to be evaluated specific to each model's purpose, which simply can't be known today. ISO 20022 requires data elements be documented via the process model that created the data. Although Mercator Advisory Group doesn't yet know how all of this will be managed, it seems clear that all of these new data requirements are coming at us like a freight train. 2020 will be the year when participants in the payments industry gain a better understanding of the problems and suppliers begin to construct and offer solutions.

## The Internet of Things

What does the term "internet of things" (IoT) conjure up for you? The first things that payment geeks typically think of are cars and watches, but those are most often just payment-enabled devices that have a Near Field Communication (NFC) capability and are provisioned with a payment token. They are not really IoT at all. Mercator has established the following definition for IoT payments that focuses on the true intent of any IoT solution, which is to make a data-driven decision:

*An IOT transaction is a real-time data-driven payment decision that at the time of the transaction does not involve a buyer decision. Instead, the buyer has previously authorized a plan for payments to be made automatically based on feedback from a sensor or automated data source. Examples include smart ink order from a printer, a smart electricity payment, or a car insurance payment based on telematics devices.*

The dollar volume in payments that are already associated with IoT will likely surprise you. According to Mercator's current estimates, residential electricity accounts for \$66 billion in IoT payments. Some \$11 billion in IoT payments is made for IoT-based insurance. Approximately \$7 billion in IoT payments are made for residential water service. In short, the IoT payments sector, while small compared to the entire payments market, is larger than most people expect and is growing fast.

Of course, the next question is how fast is fast? Mercator has begun creating an IoT benchmark, similar in concept to the Prepaid Benchmark we started in 2005. We will identify each industry implementing the IoT infrastructure and then use the definition above to capture payment volume associated with each segment. Our goal is to create a taxonomy that identifies all industries and segments generating IoT payment transactions. Creating the taxonomy will enable us to measure total IoT dollar volume, specify the contribution made by each industry, and identify primary use cases.

Multiple industries are already heavily investing in IoT infrastructure today. Currently Mercator is evaluating the Agriculture, Logistics, Insurance, Home, Health, City, Utilities, and Manufacturing sectors. One example of how quickly IoT can be deployed into the market is epitomized by Amazon's IoT API, which enables any smart appliance to automatically order consumables based on gathered data. Fortune 500 companies such as Samsung, Philips, and General Electric are already using it today. 2020 is expected to bring exponentially more IoT devices, and Mercator will be tracking their penetration into the payments landscape.

## Conclusions

Payments are exciting again. The changes are coming faster than ever. As we stated in last year's Outlook for the new year, we advise everyone to look at the horizon and adjacent markets to identify disruption. Review your portfolios to identify every high-margin area of the business and then review every fintech and adjacent market startup that is targeting that business. Study the business model being used by startups, and assume that the value proposition they offer will succeed if you don't take steps to prevent it. Identify the steps you need to take, and then execute them against those competitors. This might be a simple pricing strategy that targets the competitor or a full product implementation that mimics that competitor. It might even be a strategy to partner with a potential competitor. Whatever is needed, protect those high-margin business areas and don't think for a minute they are unassailable. Where there are high margins, there is opportunity.

Last, and as always, stay alert to new regulatory changes. More than ever, regulations and technology are challenging the ways in which companies collect, store, and manage data. Try to get ahead of this because it won't be an easy problem to fix and may even require you to reconsider what data you should retain given the current inability to understand where, how, when, and why that data was collected.

## References

### Related Research by Mercator Advisory Group

[\*Distributed and Self-Sovereign Identity Solutions: Part 2, Implementations and Suppliers\*](#) (September 2019)

[\*Distributed and Self-Sovereign Identity Solutions: Part 1, Technology Overview\*](#) (August 2019)

[\*How Banks Can Safely Do Cryptocurrency\*](#) (April 2019)

[\*Securing E-Commerce: Competing Technology Crowds the Market\*](#) (February 2019)

[\*2019 Outlook: Emerging Technologies Trends in the U.S.\*](#) (November 2018)

[\*Developing an Appropriate and Sustainable Business Plan for an API Portal\*](#) (April 2018)

[\*Biometrics: A New Wrinkle Changes the Authentication Landscape\*](#) (July 2017)

### Endnotes

<sup>i</sup> <https://www.theverge.com/2019/11/12/20960409/apple-card-discriminatory-credit-limits-goldman-sachs-brand>, accessed 11/12/2019

<sup>ii</sup> <https://www.propublica.org/article/bias-in-criminal-risk-scores-is-mathematically-inevitable-researchers-say>, accessed 11/12/2019

<sup>iii</sup> <https://arxiv.org/abs/1707.09457>, accessed 11/11/2019

<sup>iv</sup> <https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G>, accessed 11/11/2019

<sup>v</sup> <https://www.paymentsjournal.com/visa-to-use-rambus-tokenization-to-extend-into-more-payment-networks/>, accessed 11/12/2019

<sup>vi</sup> <https://newsroom.mastercard.com/press-releases/mastercard-announces-acquisition-of-vocalink/>, accessed 11/12/2019

<sup>vii</sup> <https://www.mercatoradvisorygroup.com/Reports/Distributed-and-Self-Sovereign-Identity-Solutions--Part-2 - Implementations-and-Suppliers/>, accessed 11/12/2020

<sup>viii</sup> <https://www.ripple.com/insights/rippletnet-growth-announcing-more-than-300-customers/>, accessed 11/12/2019

<sup>ix</sup> <https://dailyhodl.com/2019/11/12/ripple-exec-says-moneygram-launching-xrp-in-multiple-markets-including-thailand-and-mexico/>, accessed 11/13/2019

<sup>x</sup> <https://www.coindesk.com/chinas-central-bank-close-to-launching-official-digital-currency>, accessed 11/14/2019

<sup>xi</sup> <https://www.forbes.com/sites/michaeldelcastillo/2019/08/27/alibaba-tencent-five-others-to-recvie-first-chinese-government-cryptocurrency/#2d02d97b1a51>, accessed 11/14/2019

<sup>xii</sup> <https://www.bloomberg.com/news/articles/2019-11-12/blockchain-is-dead-crypto-geeks-debate-merits-of-once-dear-tech>, 11/13/2019

<sup>xiii</sup> <https://thefinanser.com/2019/03/blockchain-dead-long-live-blockchain-2.html/>, accessed 11/13/2019

<sup>xiv</sup> <https://www.globenewswire.com/news-release/2019/10/09/1927399/0/en/Is-Blockchain-Dead-No-Industry-Experts-Join-Together-to-Share-How-We-May-Just-Not-Be-Using-it-Right.html>. Accessed 11/13/2019



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