Slideshow Top 10 FinTech Companies to Watch

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Ne appr oaches to security and customer interaction technology dominate BTN editors' picks for this year's Top 10 FinTech Companies to Watch.

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Plaintiff's Trial Exhibit
PTX-391
Case No. 18-cv-00094-HCM

CENTRIPETAL-CSCO 481428

Patent Owner, Centripetal Networks, LLC - Ex. 2026, p. 1



Bion m

Technolog : Wearable computing device for identity and authentication.
Wh It 's One to Watch: The wristband is expected to ship in 2014 and could offer a simple way to unlock mobile banking apps, car doors and other things of value. The product comes at a time when consumers and businesses are struggling to solve the problems of ineffective passwords that are easy to forget.

Spotting an opportunity to identify people by their heartbeats, this young Canadian company began building a wearable computing device for the lesser known biometric.

In September, the startup unveiled its vision in the form of a wristwatch called Nymi that will ship in early 2014. More than 5,000 consumers preordered the device within four weeks of its debut.

"Identity and security have been ripe for disruption for a long time," says Karl Martin, chief executive and president. "There hasn't been innovation. Products are hard to use from the end-user perspective."

Bionym says its wristband will serve unlimited identity roles like opening up cars as well as unlocking mobile banking and enterprise apps □ eventually. "Every day, we use identity for multiple purposes," Martin says. "There can be solutions such as ours to change the way people think about identity."

Nymi measures an electrocardiogram (ECG), a recording and interpretation of the bioelectrical activity of the heart, when a user touches his opposite hand to the wristband. The device then communicates with an app running on a tablet, smartphone or computer to see if the reading is a match with the user's prerecorded heartbeat. Nymi, which comes with an embedded ECG sensor, motion sensor and Bluetooth low-energy radio, keeps the user authenticated until he takes off the device.

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For now, the heartbeat templates are stored on devices rather than the cloud.

In early October, Bionym was readying its formal program for developers to create apps to bypass passwords and integrate Nymi into other systems, among other things.

"We have interest from major electronic companies and we will be co-developing there," says Martin.

About 10 people work at Bionym and Martin expects to add about seven employees by yearend.

How the wearable computing market will shake out is top of mind for the startup. Bionym gets asked why it refrained from embedding its software into an existing smartwatch. "The answer is we aren't looking to put all of our eggs in one wearable segment," Martin says. "Nobody knows where it is going."



Pindrop

Technolog : Pattern recognition to detect call center fraud.
Wh It 's One to Watch: The technology addresses the emerging problem of fraudsters gaming call center agents.

Device ID is tough. The process, which authenticates each individual smartphone, tablet or desktop, relies on figuring out the hardware. More importantly, it's about figuring out that special signature behind each device that makes it unique. The digital fingerprint that makes a bank customer's iPhone her own.

Pindrop Security is taking a different approach: using its software to listen closely to every call.

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The Atlanta bank tech vendor is fighting call center fraud by mapping the more than 100 different attributes that makes the sound of every phone special.

"What we are trying to do is bring trust back to the telephone channel," says Vijay Balasubramaniyan, the founder, CEO and CTO of Pindrop.

He explains that, over time, call centers have become volatile. Social engineering tactics have criminals correctly guessing the answers to challenge questions and other identifying information banks use to authenticate customers.

"Fraudsters have quickly gone through the telephone channel," he explains.

"We extract about 127 different features, such as noise characteristics. We can go further into calls, seeing if a call was made using Skype or Google Voice, for instance. We can identify where in the world the call is coming from."

Balasubramaniyan, 33, says he came up with the idea while working on his doctorate in computer science at Georgia Tech (some call it the MIT of the South, "We call MIT the Georgia Tech of the North," he jokes). He graduated in 2011.

"You need to take the entire [call] into account, and we have the ability to look at everything outside the voice," he says.

Next year, Balasubramaniyan says his company plans to introduce voice biometrics to increase the accuracy of Pindrop's technology.

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Cro dComputing Systems

Technolog : A ebsite that matches freelancers around the world to companies seeking to outsource, and artificial intelligence for assigning and evaluating the quality of the work.
Wh It 's One to Watch: The company is harnessing a global shift toward a freelance economy, and its technology could change the way companies like banks handle outsourcing.

Seeing a fundamental labor shift around what NYU professor Clay Shirky calls "cognitive surplus" (in which people use the free time they spend creating cat GIFs to do freelance work on the internet) got Crowd Computing Systems' founders, researchers at MIT, thinking. They had been studying artificial intelligence and its impact on financial fraud.

"We quickly pivoted that research and applied our artificial intelligence to managing this cognitive surplus, the ability to have an artificial intelligence engine not only distribute work to people around the world, but also judge the quality of the output of that work and deliver it to the enterprise," says Max Yankelevich, CEO and founder. "This was one of the biggest challenges we saw with that shift to the freelance economy. You don't have that person sitting there in your office to manage them closely. At the same time, now that you have access to many more people around the world, you have the ability to do more work on a much larger scale, paralleli ing the work. You need computer aids like an artificial intelligence to do that, otherwise your management overhead would be tremendous."

About 46% of Americans are full-time employees, Yankevelich estimates, the rest are freelancers. "The situation is similar around the world," he says. "By 2020, both Deloitte and Accenture are projecting much larger numbers in the freelance economy."

The company has 20 million freelancers in its database. It matches workers up with work, evaluates the quality of that work and bases pay and future work assignments on the level of quality. The company's 50 employees, who work in New York and Newark, N.J., are mostly engineers.

The company plans to quadruple its sales and marketing staff in the coming year.

In early October, Crowd Computing was getting ready to announce a deal with a large financial information provider. Investment banks, which are already heavy users of business process outsourcing, are among the company's clients, as are online retailers and consumer goods companies.

Traditional banks should come on board later, Yankelevich says. "They seem to be more conservative."

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Patent Owner, Centripetal Networks, LLC - Ex. 2026, p. 5



4Numbrs

Technolog : Mobile app to help consumers manage their finances.
Wh It 's One to Watch: By stressing good design principals, the app aims to make the banking experience enjoyable.

"I wanted to do something technical and complex that hasn't been done before in something that should be changed," says Julien Arnold, CEO. "You have to deal with your financial life every day and everybody hates it."

The want-to-be banking disruptor app goes by the name Numbrs and Arnold serves as its founder and chief executive.

The Numbrs app lets people aggregate bank account data to see a single view of their financial lives and to transfer money between accounts. In exchange for the information, the app provides data visuali ation intended to help users quickly understand their finances.

Numbrs is already live in Germany. It's coming to the U.K. next and it's expected to hit the U.S. market in 2014.

"We care a lot about design," Arnold says.

Take the way the app displays purchases, for example. Numbrs plots out transactions on interactive tiles that show how a person spent his money on a timeline. Then

Numbrs goes a step further than some personal financial management (PFM) vendors in the states, including Mint, by predicting and visuali ing consumers' f uture transactions. To do that, its algorithm assesses past spending behavior to predict up to three months of purchases. Perhaps buying a plane ticket will trigger a cab expense, Arnold suggests. The algorithm could turn into a revenue model where users tap to buy predicted purchases within the app.

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The purchase forecast becomes more predictive as data is added. "If you open a bank account and want the future timeline to work tomorrow, it won't happen," he says.

A consumer can also tag a transaction to not factor into the forecast. Perhaps he stopped going to Starbucks, for example, and wants the timeline to reflect his decision.

The Numbrs team has been developing the app for more than a year and is now focused on getting ready for its American launch by exploring partnerships with banks and companies like Intuit and Yodlee. "We're evaluating," Arnold says. Numbrs will likely find one of its biggest competitors in Check □ an app that lets people link in outside accounts and pay people and businesses.

Arnold seems ready. "We definitely want to play in the champion's league," he says.

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Silver Tail

Technolog : Software that fights fraud with analytics.
Wh It 's One to Watch: It has an ability to detect shady behavior in web traffic that's particularly helpful at catching distributed denial of service attacks.

Once-hyped startup Silver Tail □ which has since been acquired by EMC and boiled down to a service in the storage giant's RSA subsidiary □ looks for shady behavior in aggregate.

The software sends up a flag anytime a group of users is doing something questionable. Perhaps, explains an executive, they're trying to use nonsense passwords

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repeatedly across different users.

Silver Tail's software looks for scams that otherwise might get lost in the noise of everyday web traffic.

The end game, says Jason Sloderbeck, a director of product management at RSA, is a technology that alerts banks to breaches quicker than more conventional methods.

"There are a lot of complicated cyber attacks and fraud schemes, password guessing," says Sloderbeck. "If 1,200 users are mirroring each others' movements, it's suspicious."

The importance of Silver Tail's methods have been exposed during the surge in distributed-denial-of-service and denial-of-service attacks that banks and others have experienced over the past year or so.

"All of these examples apply to any website, so when we were originally detecting or preventing distributed denial of service we were looking at anomalous behavior," says Sloderbeck. "One of the things that we found our customers saying is that they may not have been a primary (customer), but they found Silver Tail was sending fraud team alerts that this group of [websites] have a high threat score in the area of anonymous behavior."

EMC acquired Silver Tail Systems for its talent and technology in October 2012. The day it was purchased, a spokeswoman says, the company became part of EMC's subsidiary RSA.

Before that, Silver Tail garnered attention from big bank investors.

In 2011, Citi invested in Silver Tail Systems. Overall, Citi gave $22.1 million in three rounds.



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Zafin

Technolog : Relationship-based pricing software.
Wh It 's One to Watch: This newish iteration of an age-old concept is irresistible to banks, and they're likely to implement it in droves.

As fees become more repugnant to consumers and commercial clients and banks seek new sources of revenue, Zafin believes its models can help calculate prices that mutually benefit banks and their customers, taking the whole relationship into account.

Bank of the West in California has been a marquee U.S. client and officially launched Zafin's miRevenue software suite to enable relationship pricing and product bundling for its SME checking product line in late October. miRevenue is a product and pricing lifecycle management platform for bringing products to market with a focus on revenue enhancement.

"The banks are saying, let's give clients a base product with a base price, let's entice them by giving them tangible benefits as they consolidate their relationship with a bank," say Al Karim Somji, CEO of Zafin. "In this effort, we'll be able to leverage more fees over a longer period. This is the direction the banks are taking.

I think banks will try to become more digital marketplaces, rather than focusing on relationship banking. That means being able to ply clients with the right products, giving them the option to opt in and out of features, and being transparent on how they charge the client."

Banks will need to become financial services digital markets over time, Somji believes. "As an example, you're traveling and you need travel insurance or need FX options or to get certain assets, these are all options that are only required for a short period of time," he says.

The software gathers information about all the products and services a customer uses. It lumps customers into segments. It provides a "what-if-analysis" that lets the bank identify product, price model-fits, and revenue/profitability impacts for new product offerings or product changes. Once a fee is set, Zafin's software can look at how any change in combination with other products affects the bank's bottom line.

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Lenddo

Technolog : An online platform for underwriting small loans. Borrowers must have a digital way to receive the funds.
Wh It 's One to Watch: Lenddo is using social media sources to help score the creditworthiness of middle class borrowers in emerging markets. The company plans to improve its mobile loan application process and launch its services in new countries.

With lenders turning people down for small loans, startups have been emerging to offer alternative financing. Lenddo, founded in 2011, uses social media data to underwrite small loans in countries like Mexico, Philippines and Colombia.

The company requires an applicant to become a Lenddo community member, link to his profiles from sites like Twitter and Facebook, and get a reference from another member.

The platform, which counts more than 300,000 members, works off the assumption that internet friends are real friends who will support their connections.

"People are using Lenddo to help their friends get loans," says Jeff Stewart, chief executive. "Humans are very good at judging who else in the community is trustworthy."

The average Lenddo loan is about the si e of one month's paycheck (which translates to about $400 in the Philippines) and paid back in nine months. Most borrowers use the capital to fund education for a family member, buy a smartphone, or pay for a health-related need. "We try to lend for life-improving purposes," Stewart says.

All borrowers need a way to receive funds digitally, which in some countries presents difficulty.

If and when someone fails to make a payment, the endorser's Lenddo score will drop. "This creates a powerful social benefit," Stewart says. "There's a strong incentive to

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repa ."

Lenddo's approach borrows from practices deployed by companies and banks for decades.

"We are essentially doing the same things as microfinancing," he says. The twist, of course, is assessing character via online communities. The Lenddo to-do list includes broadening its services into new countries like Peru and Indonesia and simplifying the mobile application process. "Our customers don't want to go to a branch," Stewart says. "We're trying to make [the experience] as simple as possible."

He expects social reputation-based lending to become more common in years to come. "Financial services is entering its Napster moment," Stewart says. "Crowds can talk to each other and vouch for each other."



Centripetal Networks

Technolog : Appliance that provides a "clean internet" by applying millions of rules to fast-moving network traffic.
Wh It 's One to Watch: The appliance has the potential to detect and deter rapidly changing cybersecurity threats on the fly.

The internet is in danger of flying apart because security was not built into it from the beginning, asserts Steven Rogers, CEO of Centripetal Networks. He named his security company after the force that holds spinning objects together. "If we can't solve cyber and security issues around the internet, we may lose trust in the whole thing," he says.

Most large companies with big security teams are not able to adequately protect their networks, Rogers says. "In the testing we've done, in every case, everybody is hacked

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and multiple times," he says. "It's worse than they reali e. It's growing and a serious problem. The industry has been working on it for a decade, it hasn't been solved."

Centripetal's RuleGate technology, a high-speed computer combined with proprietary software, is meant to catch cyberattacks of all kinds: malware ("by far the biggest problem of cybersecurity today," Rogers says), distributed denial of service (which Rogers terms a "very expensive annoyance") and insider attacks, where a bad employee or malware disrupts business operations.

The RuleGate appliance, Rogers says, can protect and prevent such attacks at scale. "Cyberattack is essentially a scale problem," he says. Firewalls and intrusion detection systems do not scale sufficiently, he argues.

The RuleGate software uses standard multicore chips and parallel processing combined with proprietary algorithms, Rogers says, to achieve the scale needed to keep up with fast-moving data.

"Today we're running over a million complex rules at full line rate for 64 byte packets at 10 gigabytes. No one else in the planet can come close to that."

The technology compares incoming traffic against millions of rules and policies informed by analytics on known "bad guys."

Centripetal introduced clean internet in July. Since then it's signed up its first internet service providers and has received trial requests from 15 of the 20 largest banks, Rogers says.

Large service providers will likely be the ones to buy RuleGate and offer clean internet services to banks and other customers. They are compelled to rid their networks of attack traffic. "When you get a glass of water from your water spigot at home, you expect to be able to drink it, not fall down sick," Rogers observes.

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Personetics

Technolog : Predictive analytics software that combs customer interactions and generates real-time recommendations for customer service and sales.
Wh It 's One to Watch: Banks are eager to use technology of this nature to keep customers happy and generate revenue. PNC is using similar technology created for it by Pegasystems.

With the increasing use of digital channels and banks not connected to the consumer the way they once were, analytics can help fill the void, says David Sosna, CEO and co-founder of Personetics.

The company aims to provide a "daily and relevant experience" for the customer. This means it susses out the customer's current situation by looking at transaction data as well as the screen the customer is looking at and sends out a relevant message to the customer's browser, app, ATM or text messaging app. Sometimes the message resolves a problem, other times it suggests a way the customer could save money or improve her financial picture. The software might determine the customer has been charged twice for something and issue a warning. If a customer is using a costly payment service, the bank could offer a cheaper one.

Personetics' differentiator from some other customer analytics products is its ability to capture what the customer is looking at on screen when he contacts the bank, whether that's a web page, a section of a mobile app or an ATM message.

Banks have been testing the software, Sosna says, on their online and mobile app channels. Some are using it to come up with recommendations of banking services.

"Maybe there will not be new products per se, but there will be more utili ation of e-payment facilities, overdrafts and quick line of credit facilities the bank is offering," Sosna says. The software could be used to offer an electronic alternative to a customer who has been spending a lot of time in a bank branch. When the communication is

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personali ed to the customer's circumstances, "the response rate is much, much better than just a general promotion," Sosna says.

Banks have to strike a balance between helpful suggestions and aggressive cross-sales, he suggests.

"We strongly believe that if you're able to pick up the relevant items from consumer perspective, which doesn't always match the selling desire of the bank, you can achieve a much better result," he says. "If we recommend too many products on an ongoing basis, I don't think that's very effective."



Kofax

Technolog : Paperless mortgage software that lets borrowers provide information by snapping pictures of their documentation.
Wh It 's One to Watch: The company is digiti ing mor e and more of the financial services world.

Kofax has a simple mission □ digiti ing ph ysical records.

For the past 20 years, this Irvine, Calif. software vendor has been helping bankers move mortgage and other financial documents from paper to computers. Still, in just the past year, Kofax has evolved.

Last fall, the company introduced an application that lets mortgage lenders capture information by allowing borrowers to snap smartphone pictures of their papers.

It's been "a big transition for us," says Anthony Macciola, Kofax's CTO. "With this shift to self-service, and this shift to creating user experiences that are user-centric, the fight for mortgages or even onboarding new customers" is huge.

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Indeed, smartphones have shaped financial services in the same way it's changed bank customers' lives.

At the end of its fiscal year 2013, which closed June 30, Kofax turned a profit of $10 million, or 12 cents a share.

Its revenue was $266.3 million. Kofax's customers include Wells Fargo, Bank of America, Citi, HSBC and Zions Bancorp, according to a spokeswoman.

In October, Kofax announced its TotalAgility framework, business process management software that is designed to improve the way customers work with their bank.

The technology, Macciola says, allows banks to be more competitive and differentiate themselves from a user experience standpoint.

"It's the introduction of a full blown mortgage automation platform," he says. "It has the ability to revolutioni e the industry and that will be something new for us."

Kofax has just begun to chat with customers about the service. The platform is set to launch in the first quarter of next year.

"The more out of the box the experience we give our customers, the quicker the time to market, the lower the cost of ownership," says Macciola.

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