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Coming Together

One of the side benefits of *Waters* reaching its 25th anniversary has been the number of conversations we've had about ways to innovate and reform our coverage, moving forward. The simple fact is that the industry we cover, and have done so for a quarter-century, has changed immeasurably—even over the past few years. The crucible of 2008 and the subsequent regulatory reform that tore down much of the existing order in markets, rebuilding it to be stronger and more resilient, also accelerated an ongoing trend toward technological innovation. The fact that the first jolts of fintech mania began to be felt as swaths of post-crisis regulation were being implemented is not coincidental.

One of the primary changes in the market that I've witnessed, at least, over around eight years of covering technology (and more in the wilds of "proper" finance), has been how technology and data have been delineated. Once, in the halcyon days of even the turn of this decade, there was a strong division between the two. *Waters* even operated two distinct data titles—*Inside Market Data* and *Inside Reference Data*—which eventually morphed into one.

Then, as the decade progressed, those lines began to blur. Chief information and chief technology officers often became one and the same (and were often always such in the US, which has always had more of an East Coast–West Coast difference between the titles rather than a practical one), and the rise of the chief data officer role made tech and data become intertwined disciplines.

And, if you look at the pages of this issue of *Waters* magazine, ostensibly the technology arm of the wider WatersTechnology group, you'll find that most of the features could be easily at home in the pages of *Inside Data Management*. Josephine Gallagher's feature on biometrics, on page 10, for instance, is really a feature about data analytics. Likewise, Emilia David's feature on page 32, is about co-location and datacenter architectures for cryptocurrency exchanges. Not too long ago, that would have been the bread and butter of the data titles.

All of this, to get to the point, illustrates that financial-market technology is anything but a static area to cover. It evolves, foundationally as well as cosmetically, and everyone associated with the industry—whether you're a market-data professional or a journalist on the fintech beat—has to evolve with it or die out.

As *Waters* moves into the end of its 25th anniversary celebrations, and on to the next 25 years, expect our coverage to align more to this new normal, too. W

James Rundle
Editor

Inside Market Data | Inside Reference Data | Buy-Side Technology | Sell-Side Technology
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Contents

Howard Edelstein
BioCatch

October 2018

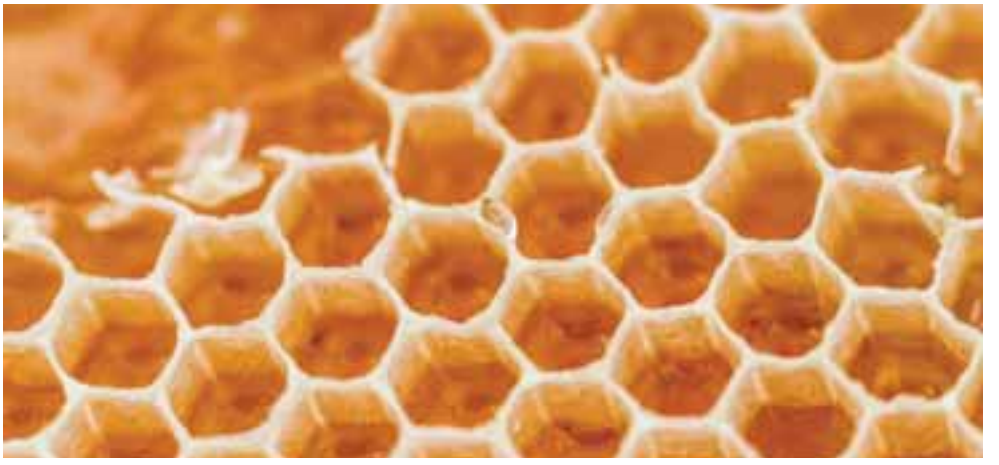
36
Anthony Malakian: The End of Privacy

28
Mind Your Language: Surveillance Systems Tackle Conduct Risk
By Hamad Ali

32
The Fast and the Curious: The Latency Barrier for Institutional Crypto Traders
By Emilia David

Algomi Pivots Offering Away from Honeycomb to Alfa

Usman Khan sits down with *Waters* to discuss how the vendor will look to change course in 2019 and focus on the development of the Alfa platform. By Anthony Malakian with additional reporting by James Rundle



Soon after Algomi was founded in 2012, it became a darling of the burgeoning fintech scene in London. Its Honeycomb platform aimed to spur liquidity in the illiquid bond market by organizing information within the bank—for the bank—and then allowing the institution to act as an anonymous database for the buy side. But new regulations—and, specifically, the revised Markets in Financial Instruments Directive (Mifid II)—have forced the vendor to shift its roadmap.

This change really started in May 2017 when it acquired the Alfa platform from AllianceBernstein. The coming 15 months, though, will see Algomi focus on shifting its business offering toward Alfa and away from Honeycomb. While the pipes of the Honeycomb network will still exist, Algomi is working toward building Alfa on top of that infrastructure, says Usman Khan, co-founder and CTO of Algomi.

"The Honeycomb concept was good from a perspective of [providing] soft information to clients," he says. "From Algomi's perspective, we still have the infrastructure. So being able to distribute Alfa through that infrastructure is definitely an objective of ours. The Honeycomb screen …will get replaced by the Alfa screen. At some point next year, [users] will refresh their browser or refresh whatever they have and all of a sudden Alfa will appear."

A New Year

After the acquisition, Algomi's team first had to make it cloud-friendly. Alfa sat inside of AllianceBernstein's systems, so they had to essentially surgically remove it and make it so that it could be provided as a cloud-based service, as the hard tech install was too expensive and time consuming for users, Khan says.

With that accomplished, there are now two major pieces to this transition that will be rolled out—they hope—in 2019.

Alfa, as currently constructed, is an anonymized, real-time data aggregation tool, but the key bit that is missing, Khan says, is the ability to execute from the platform. He stresses that Algomi is not—and will not be—an execution venue. But the company does need to streamline Alfa so that people can connect through to their desired platform, such as MarketAxess or Tradeweb.

"We don't intend to become an execution venue; that is not our play," he says. "We want to help optimize the workflow. If I'm a user and I see a price on the venue, I want to be able to click within one screen, have a ticket pop up, and send that trade to that venue from that screen."

The plan is for this functionality to go into a beta-testing phase in the first quarter of 2019, with a tentative go-live date sometime in the second quarter.

The second piece of this evolution will address analytics. Khan says that after they have structured the data, they will next be able to provide deeper insights to users, such as offering quality scoring of prices for venues—"someone is quoting a price and I try and execute and it doesn't, you score that"—and also for pre-trade transaction-cost analysis. "If you have data in real time you should be able to figure out the cost of execution before you hit a venue," he says.

This piece is still well down the road, with a very rough third-or-fourth-quarter 2019 timetable, but Khan is quick to say that the actual release date could change.

Many Moves

Algomi has seen a significant amount of change over the last few years, with this pivot being just the latest move.

Perhaps the biggest shake-up, though, was the departure of co-founder Stu Taylor, who stepped down as CEO earlier this year and was replaced in August by Scott Eaton, the former COO for MarketAxess Europe. Khan, during the interim period, took on the CEO role on a temporary basis. But that was just the latest in a series of big announcements.

A tough 2016 saw the company report a $15.5 million loss. A series of investments through the course of 2017 by the likes of Euronext, AllianceBernstein, and S&P Global helped Algomi to shore up its finances as it looked to incorporate the Alfa platform and "cloud-ify" it.

In October 2017, it was announced that Algomi was expanding into the custody market by establishing a partnership with BNY Mellon and HSBC. The deal would see Algomi apply its technology to indicate trading intent in illiquid bonds held by the two banks. At the time of that announcement, Taylor, who was still with the firm, told *Waters* that the company would seek out a European custody bank to help the vendor expand its global presence. Enter Euroclear.

In July 2018, Euroclear joined Euronext, AllianceBernstein, and S&P Global, among others, as the latest investor and would join BNY Mellon and HSBC on Alfa's development.

Khan says that one of the big things that they were hearing from both the sell side and the buy side was that they knew that there was a lot of intelligence to be gleaned from the data sitting inside of these custodians. They have real-time information about holdings, which is incredibly valuable information, but the challenge is that this information is private.

"You can't do anything with it," Khan says. "You can't give a real-time holding list of 'here are the holders of these bonds,' because the holders will never allow that. If I'm holding this bond or a volume of bonds, I don't want people to know that."

The way it works today is that asset managers report on their holdings quarterly, but this information is months old by the time that information is scraped from the firm's website. Khan says they have the ability to aggregate and anonymize that information to help users better match orders using real-time information. When finished, Alfa will allow users to see aggregate holdings for a given bond, but that information will be up-to-date rather than weeks-or-months-old information. Additionally, if the buy-side trader or portfolio manager wants to be alerted on their holdings that there's some activity happening in the market, Alfa will be able to handle that, too.

Before any of this becomes a reality, though, they first must establish a protocol for how to consume the data from these venues and figure out how to alert relevant holders.

"There's a whole methodology there; it's a lot of work," Khan says. "So we're trying to come up with a way to do that in an agnostic fashion, which can then be applied to BNY, HSBC and any custodian."

In Progress

Currently, the vision for the end state—or at least, what it will look like when it's fully live—is that an execution trader or portfolio manager will have uploaded their watchlist of ISIN identifiers, which will come from their order management system, as Alfa is integrated with it. They will then click on a bond to see the holdings information. From there they will see that, for example, there are 15 holders of the bond and by volume how much is held at the moment. As those values change, they will see that change in real-time, Khan says.

That will be the first aspect of Alfa. The second will allow a buy-side firm to opt-in and say that they are happy for Algomi's algorithms to run against their custodian data and alert them when the Alfa platform detects some activity in the bonds that they are holding.

So, for example, a trader at T Rowe Price uploads a watchlist of bonds; that sends out a signal to, say, AllianceBernstein that a trader is looking at some bonds that AB holds. Because Algomi is not an execution venue, it will not connect those two buy sides. Rather, they will execute via the venues that they are connected to—say, MarketAxess or Tradeweb. So they are alerted through Alfa that there's activity, a notification appears, and then they will go to their dealers and see what they are saying and then execute through them.

At its core, Alfa will be a messaging router, Khan says.

"We started off with the concept of organizing information within the bank for the bank, and then allowing the bank to act as an anonymous database for the buy side. But the banks have invested more than what even Algomi could give due to regulatory reasons and we need to tap into that," Khan says. "So our sell-side offering is still there in the banks that we had, but from our perspective, the objective now isn't to continue to build on that because the banks are doing it themselves. They've set up their pipes to distribute to the buy side. So our objective now is to hook up to those pipes and provide that content to the buy side." W

SS&C Unveils Singularity for AI-Enhanced Back Office

New platform will use robotics and machine learning to streamline accounting and reconciliations workflows. By James Rundle

SS&C Technologies is developing a middle- and back-office platform for accounting and reconciliation activities that uses machine learning to assist with trade breaks and other errors.

The platform, named SS&C Singularity, is being used internally at SS&C during its soft launch, and will provide a single platform for fund-accounting operations. Delivered on a software-as-a-service basis, the machine-learning logic embedded within the software can read user-submitted data files, such as custodian-provided drop copies, and identify trade breaks and reconciliations issues on a near-real-time basis. Robotic process automation (RPA) techniques are used to automate workflows and cut down on manual intervention.

"What we've already built, which is really just the tip of the iceberg, is that we're automating everything after the break," said Normand Boulanger, vice chairman at SS&C Technologies, speaking on a panel during SS&C's annual Deliver client conference, held in Las Vegas on September 12 and 13. "SS&C Singularity is the first smart system, we've embedded the AI into it, and that's a key point—a lot of people are inventing AI tools to sit on top of legacy systems, but I don't think that's going to be particularly effective. Here we've embedded it into the system, so every time an event takes place, there's some sort of robotics or machine-learning process taking place."

The platform is designed to be an end-to-end solution that works across asset classes and industry sectors, including fund administration, institutional asset management, insurance, and real estate investment trusts.

"The vision is that, over time, this will be a single platform that serves a large percentage of our customer base, and will give [clients] leverage on a total-cost-of-ownership basis," said Scott Kurland, global product and marketing manager for Singularity.

SS&C estimates that productivity gains from using the platform could reach "close to 50 percent" in some instances, or even more—one client that is currently live with the platform, said Kyle Fields, vice president at SS&C GlobeOp, has reduced processes that took six business days to accomplish down to two.

"How we're doing that is in a couple of different ways, one of which is that the pipes are connected to Singularity as far as all of the Bloomberg data feeds that are coming in, securities masters, corporate actions, valuations and so forth, all of that is real time versus having to go through a terminal, run a report and so forth," he said. "In addition to that, the reconciliations tool is built inside Singularity, so instead of having a system that sits on top, we have the ability to run reconciliations, identify the break, and use the artificial intelligence inside Singularity to rectify the break on the spot."

In addition to several live clients, another five are running parallel states between their existing setup and an instance of Singularity, he added. SS&C said that there are no deadlines for transitioning to Singularity as of yet and that it is still early days for the product. W

Storebrand AM Completes Move to SimCorp Dimension

Norway's largest private asset manager finalizes the last leg of its technology consolidation project.
By Josephine Gallagher

Storebrand Asset Management has announced it has integrated SimCorp Dimension's front office and fund management technologies to further automate and standardize investment processes as part of a wider consolidation strategy.

During an IUCM SimCorp event in Milan on September 18, the Norwegian asset manager said that the latest implementation marks the last leg of the project to provide a holistic and single system approach to its front-to-back office operations.

Following a review process, in 2016, Storebrand identified a need to establish a unified operational infrastructure to remove unnecessary IT systems, reduce costs and enable scalability for future growth. On the sidelines of the IUCM event, Erik Kaland, COO of Storebrand Asset Management, explained that when he joined the asset manager five years ago, he quickly realized the firm needed to replace decades worth of fragmented front office systems, custom-built applications, manual processes, and structural inefficiencies.

"The picture I was confronted with was that we had a lot of customization and many systems, more than 100 we counted at one point, and we no longer had the skillset in our employees to maintain and develop these further," he adds. "It was very costly and it reduced our agility and ability to onboard new types of solutions."

Kaland further explains that the complex IT infrastructure, combined with diminishing returns across all asset classes, influenced the firm's decision to scale back its IT systems. He highlights that the asset management community is under increasing pressure to reduce costs, tackle fee issues and compete with migration to smart beta and passive portfolios.

"We had a situation with higher costs, high complexity, lower agility, and diminishing margins," he says. "So we had to do something. It is a fundamental strategic choice that you have to make."

During Storebrand's restructuring, it selected SimCorp Dimension as its core IT engine and has since decommissioned multiple IT systems across order management, execution management, portfolio management, and external risk systems, saving an annual cost of €1 million ($1.7 million). Among those removed were Microsoft Excel models, customized features and Charles River's front-office tools. Despite that, Storebrand has retained parts of the older system such as its factor-based algorithmic funds for portfolio managers, which has been integrated into SimCorp Dimension.

As part of the consolidation project, the asset manager has also automated its risk management and post-trade compliance operations using SimCorp's Compliance Manager technology. This has resulted in a 58 percent reduction in post-trade compliance breaks.

In addition to the recent front office integration, Storebrand AM will also implement SimCorp Dimension's fund-administration technology, replacing five different fund configurations and enabling multiple fee setups. The fund integration to date has increased straight-through processing for all funds, minimized operational maintenance and enabled a faster time to market with the ability to provide new share classes live in less than 24 hours.

The SimCorp integration will also provide real-time data analytics designed to improve the front office's investment decisions. The SimCorp Dimension modules are supported by its investment book of record, its centralized source of data. Klaus Holse, CEO of SimCorp, explained at the same event that having this single source of data throughout the front and back office of an asset manager is key to driving efficiency, reducing operational issues and enabling scalability within a business.

"In some sense it's simple, but consolidation drives an alignment across the company, because suddenly the compliance department, the risk department, the portfolio manager, the accounting staff are all seeing that one set of accurate, real-time data," he says. "There's no more data discrepancy and time wasted on reconciling start-of-day positions," he adds.

Since its restructuring, Storebrand has been looking to continue to reduce costs, remove inefficiencies, grow strategically and scale internationally. One example of this is its recent acquisition of Skagen, a Norwegian active-management firm, in October 2017. W

Data Issues Still Seen as Higher Investment Priority than AI

Investment spend is largely seen to be going to data management programs before emerging tech initiatives. By James Rundle

Despite widespread industry chatter around the perks and benefits of artificial intelligence (AI), banks are still largely concerned with more prosaic issues relating to data governance and management than they are emerging technologies.

The double whammy of data-intensive regulations going live in quick succession, specifically BCBS 239 and the General Data Protection Regulation (GDPR), in particular, has stretched the capabilities of bank technology and data departments.

In many instances, chief data officers (CDOs) say, this has been due to a lack of foresight in some areas of the industry around how to build effective platforms to tackle regulatory challenges associated with the two rules.

"Across the financial sector a lot of work has been done around the data infrastructure that supports the management of trading and product offerings, such as BCBS 239, and many banks started with a large legacy infrastructure that needed to be remediated for BCBS 239," says Gary Goldberg, CDO at Mizuho International. "GDPR has required the same banks to implement similar controls and standards around personal data that BCBS 239 required for the financial data, but if an organization didn't address BCBS 239 strategically and apply those same lessons to non-financial data, then it's very possible that they had to start again for GDPR."

This problem, Goldberg says, has provided a "salutary" lesson for banks in how to deal with complex data compliance projects, which can abruptly and quickly consume resources that might otherwise be deployed in more forward-looking initiatives, such as machine-learning projects and robotics research.

A recent survey by data specialists Gresham Technologies, the Financial Information Management Association and WBR Insights also found that projects involving GDPR represented the highest level of complexity for financial institutions, which often jarred with ongoing projects—for instance, banks have struggled with the right to be forgotten and the feasibility of erasing personal information from distributed ledgers, which are designed to specifically prohibit such activity. As such, data projects still take the lead on investment dollars when compared to other technology projects.

"Without a solid base of data that can be trusted, the cost and risk barriers of innovating can be prohibitive," says Bill Blythe, global business development director at Gresham.

Out of the 100 respondents surveyed, most said that they would still be pursuing emerging technology projects, with around 72 percent investing in artificial intelligence, and around 65 percent said they would be looking at initiatives related to distributed-ledger technology. However, the lion's share of respondents—around 89 percent—said their highest investment would be in data-management programs.

"All of these underlying [disruptive] technologies help data management, and data management helps many of the other technologies," said Chris Bannocks, CDO at ING, in the report. "Machine learning and AI require data in a certified state, unless you burden those technologies with data quality work."

For digitalization, meanwhile, the growing focus is on managing the coexistence and overlap of data governance and data science considerations, according to Mizuho's Goldberg.

"Data needs for data science can often differ from what is required for operational uses of data," he says. "For example, data scientists need access to data across systems and business processes that might not otherwise be required for operational purposes. In order to deliver data science projects, it is important to understand the data, its source and ensuring it's clean, and to this extent, data governance and data science are symbiotic partners. The better the data governance—and therefore the quality of the data—the better and more efficient the data science can be."

This problem isn't just confined to the sell side, either. Speaking on the sidelines of the SS&C Deliver conference in Las Vegas, one data management head at a prominent New York-based asset manager said that GDPR resembled a "waking nightmare" for them and their team.

"We spent months getting to grips with this foreign regulation, and the amount of work it's consumed is simply incredible," they said. "It's even had to kick some other projects we wanted to work on down the road a ways—that's why it stings a bit to come to conferences like this and hear everyone talking about their latest machine-learning algo or AI integration, and I'm here like 'yeah, I just spent a few million dollars on getting everyone to agree who's in charge of data'. That's me, by the way, so it doesn't look like it's going to get better any time soon." W

UK Watchdog Concerned Over Blockchain Bandits

FCA competition chief warns that regulators may face old problems with new technology. By Hamad Ali

Regulators are increasingly being challenged on how to prevent market abuse transferring into areas like blockchain and distributed-ledger technology (DLT), as the system begins to take hold in financial markets.

"This is not a question of us seeing necessarily new issues created by DLT," said Chris Woolard, director of strategy and competition, and an executive board member at the UK's Financial Conduct Authority (FCA). "It is more about existing issues that we see in other markets where there are already ledgers, where there are already information systems, where you can get issues of market manipulation or other forms of information getting into the market. How do you avoid the same kinds of issues appearing when new technologies are deployed like the DLT or others?"

Chris Woolard
FCA

DLT is a database that uses independent copies of a ledger, called nodes. It removes the need for a central authority as the details of transactions are recording across multiple locations, all of which have to agree to changes in order for a record to be created and verified, known as a block. The most famous example of DLT is blockchain, the record-keeping system that underpins the cryptocurrency bitcoin, the name of which has evolved to become a shorthand expression for DLT as a whole.

Financial firms are particularly interested in the system due to its ability to provide a "golden source" of information relating to a transaction, or in other words, a master record that is infallible. A large amount of DLT deployment has so far been in the back office in areas including corporate-actions process and reconciliations, but most of the work has been in proof-of-concept stages, with relatively few live deployments. According to Eric Henry, head of innovation, trade finance and supply chain at BNP Paribas, there is a need to digitize. "We do consider that DLT is a great opportunity for changing the way that we are working and for moving from paper to digital," he said.

Some users of blockchain say that regulators need to play a more active role in regulating the technology. This would help bring a quicker resolution when disputes arise and build more confidence in the technology

However, others disagree, such as Frederic Dalibard, head of digital for corporate and investment banking, and the global blockchain coordinator for Natixis Group. "You have, in my opinion, to regulate the markets to allow for the use of the technology," he said. "I don't think the regulator should regulate the technology and [they] shouldn't be too prescriptive about the technology itself. The regulator should set boundaries for certain markets, and either the technology is compliant with these boundaries, then be it."

All were speaking to *Waters* on the sidelines of the second day of the recent CordaCon 2018 conference, held in London. In his closing remarks to the conference, David Rutter, CEO of blockchain consortium R3, said he expects the Corda platform to make the lives of regulators a lot easier.

When the FCA's Woolard was asked about his comments while on the sidelines of the conference, he said the regulator took a "technology-neutral approach" to technologies it sees or uses in the market. "So no one particular kind of brand," he said. "But certainly one of the things we are looking with our regulatory technology program is how can technologies like DLT actually make the job of regulations easier. This is definitely a space that we are interested in." W

Biometric Technologies:

The Identity Layer

The use of biometrics and identification technologies has skyrocketed within retail banking and has become an intrinsic part of the latest technology devices. But now the financial-markets industry is latching on to the potential of these technologies, once deemed science fiction, to strengthen and build out their security systems.

By Josephine Gallagher

Identifying a person using biological data like fingerprints, facial features, voice, signature, or iris patterns was once a futuristic idea. Not only are biometrics widely used today, recent developments have taken the concept further and it is now possible to verify identities not only by physical attributes but also behavior.

Cyber criminals are becoming more sophisticated and their attacks more frequent, leading capital markets firms to follow in the footsteps of retail banking and tech giants, such as Apple, Google, and Microsoft by integrating these identification technologies into their security systems.

Matt Palmer, senior director at consultancy Willis Towers Watson, says traditional passwords are no longer a sufficient means of security on their own and that financial firms are quickly realizing the potential of biometrics.

"We have had 10 years of investment in biometrics [in the retail and consumer space], and the results of that are fairly mature systems to identify people—via voice, or fingerprint, or other means—that are now becoming embedded in business processes for large institutions, and beginning to replace the reliance on simple passwords and two-factor authentication," he says.

According to a MarketsandMarkets report, published in July 2018, the biometrics industry is expected to grow to $41 billion by 2023. Security enhancements,

> "The whole notion of behavioral biometrics is to model you—the individual, the person—and authenticate you against your credentials that have been given to you by a bank or a financial institution."
> **Howard Edelstein, BioCatch**

however, are not the only reasons for the uptake in biometric technologies. Convenience, latency and user-friendliness have also led to the surge in the adoption.

Erik Kaland, COO of Stockholm-headquartered Storebrand Asset Management, says that although the latest identification technologies are more suited to the retail market and financial services, "getting rid of all that friction through biometric technology or near field communication (NFC) is key to succeeding" within the capital markets space.

Behavioral Biometrics

Cross your arms. Now cross them the other way. The second way wasn't as comfortable, right? This was the explanation of behavioral biometrics given by Howard Edelstein, chairman and CEO of BioCatch, a provider of software that tracks such identifying traits.

He says each individual has thousands of cognitive micro-preferences that they are unaware of. Due to significant development in analytical technologies and artificial intelligence (AI), these preferences can be used to create a digital model of a person and their innate behavior, when accessing work PCs or databases, inputting data, communicating with counterparties, executing orders or authorizing executive-level decisions, to name a few examples.

"The whole notion of behavioral biometrics is to model you—the individual, the person—and authenticate you against your credentials that have been given to you by a bank or a financial institution," says Edelstein.

Using biometric sensors, firms can create a profile of an individual from their mouse movements and keyboard strokes. This is then tracked and monitored to ensure all activity is carried out by the authorized person. The behavior of the individual is repeatedly sampled every few seconds.

Biometric technologies establish what is called a confidence and risk score to determine if an individual is who they say they are. This is often multi-factored in high-security circumstances where a person could be asked to provide multiple forms of identification such as a fingerprint and voice authentication, which could then be layered with behavioral biometrics.

"With a password it is black-and-white," says Tower Willis Watson's Palmer. "Either the password is right, or the password is wrong. That's all there is to it. When we talk about biometrics, we are no longer in that black and white world and instead we are talking about confidence and risk."

Sriraam Malavalli
Synechron

Given the volumes of data being pumped into security systems to identify, detect and monitor biometric indicators, financial services firms are turning to AI to power these capabilities. This is done using machine learning and deep neural network technologies, where the AI engine processes vast amounts of historical biometric data and learns the specific parameters that constitute as a high confidence score as possible for a person's identity. With each encounter the AI technology will continuously learn about the biological and behavioral factors that make up the individual.

"If you consider biometrics, it is a technique of what we want to imply," says Sriraam Malavalli, senior technology executive and consultant at Synechron. "Artificial intelligence, machine learning, data science or data alchemy is like a vehicle in order to achieve that."

The perks of using biometric technologies are evident. They offer additional layers of defense that largely don't disrupt a client's day-to-day workflow. But now, as banks and investment firms are beginning to incorporate these technologies into their security infrastructures, sophisticated cyber criminals are keen to exploit their inherent weaknesses.

Code Red

In a traditional scenario, where an unauthorized individual accesses an account, it can take a matter of minutes to simply reset a password. In the case of biometrics, where someone manipulates a person's identity, the reality is both the individual and the security system are compromised. Palmer explains that there are two

ways in which biometric security systems can be breached: replicating the identifier, or bypassing the technology itself.

He says sophisticated cybercriminals can lift an individual's fingerprint from a glass, for example. Over the years, security experts have demonstrated the vulnerability of security features based on single-factor biometrics. During a Mobile World Congress in 2016, Vkansee, a mobile security company, used Play-Doh to replicate a fingerprint to breach an Apple iPhone's ID system within six minutes. Another infamous example stretches back to 2002 when Tsutomu Matsumoto, a Japanese cryptographer, fooled a fingerprint sensor using a gummy bear, a fingerprint taken from a glass and a digital camera.

"All static biometrics are spoofable to one degree or another," says BioCatch's Edelstein. "What you know and what you have is kind of last year's battle; it's static, and anybody can have your identity if they want to have your identity, and everyone could know your secrets if they want to know your secrets."

Palmer says cybercriminals can equally bypass a security system by compromising an internal member of staff to access a system. The idea is that deploying biometric systems requires a systemic approach to security, whereby firms should incorporate this layer of defense at all entry points. This involves having multiple identifiers across an organization, such as authenticating and authorizing the likes of clients, internal employees and third parties.

Biometric technologies were introduced to provide an additional line of defense and protect unauthorized use of data. But given the intrusive nature of the technology, firms are presented with a unique set of challenges surrounding data ethics, as well as regulatory implications.

"There is a need for stronger regulation and legislative oversight as to how this data is used," says Palmer. "We are addressing one risk and replacing it with another and that requires a very high level of maturity in order to secure that information."

Data Troubles

Biometric security systems require large volumes of personalized data that can be used to identify a person by their physical features or behavior. The information gathered can also include biological characteristics such as heartbeat, venal structures in their fingers, or iris patterns. This information is then fed into AI engines, where the machine learns about the individual and creates an electronic model of each person.

By nature, deploying such security systems within a workplace can be invasive for those involved. This has raised questions over its limitations and whether consent should be obtained

from those participating, similar to how firms require consent to use personal data under the EU's General Data Protection Regulation (GDPR), which was implemented on May 25.

Bloomberg has been an early adopter of biometrics, launching two proprietary authentication tools in 2004—a finger image sensor on the Bloomberg keyboard, and B-unit, a portable credit card device. Phil Vachon, a security architect at Bloomberg, says that the two biggest challenges involving the technology include ethics and regulation. As many issues surrounding its regulatory scope have yet to be addressed, he says financial firms have a responsibility to carefully protect this personal data and respect those involved.

"There are a lot of open questions about the regulatory piece that have yet to be answered. As a firm you have to take a very conservative approach to how you deploy these technologies, especially in this jurisdiction," he adds.

Other issues relate to the risk of storing such data within banks or investment firms themselves, or whether third-party providers are more equipped to manage these requirements, through mechanisms such as encryption. However, this introduces questions surrounding the consent of offloading these services to vendors, and the residual responsibility of the financial firm. As a result, the gathering of biometric data will likely make firms a more appealing target for sophisticated cybercriminals and organized crime.

"Once you start recording this data it becomes extremely valuable, and we also see some targeted attacks," say Palmer. "Because if you have this type of data that is extremely valuable, that effectively can't be undone, as it's permanent security, and it can become a permanent weakness when it is compromised."

Matt Palmer
Willis Towers Watson

Erik Kaland
Storebrand Asset Management

Just the Beginning

As of now, the technologies inside trading systems have yet to mature and firms will require a level of readiness to replace legacy systems that are reliant on passwords and two-factor authentication.

Before this occurs, firms will need to consider issues regarding deployment and usability. The integration of biometrics systems will require a significant level of education and an onboarding process for those impacted. Additionally, many participants involved may be unable to use the technology itself depending their physical circumstances.

"So there is a rule of thumb that I follow from my experience: About seven percent of a user base of biometric technology is going to have a hard time with this technology," says Bloomberg's Vachon. "For example, when using fingerprint authentication, a user might have damaged finger prints because of an accident. And different sensor technologies behave differently with different skin types, which can impact the user's ability to authenticate."

Despite that, adoption of biometrics is under way. With an increase in remote working and the shift to cloud services, firms are seeking new and convenient ways to enable frictionless ways of working. One example of this, which has shown to be successful, is the use of biometric signatures to confirm transactions transferred to and from datacenters and cloud networks. This creates a digital archive of large contracts such as an Isda master agreement between over-the-counter market participants.

"We establish those cloud services within those regions with a specific signature," says Malavalli. "So all these signatures hold a validation to say 'I can, or can't, move this data over to any other network or any other cloud movement setup.'"

While flawed, biometric technologies can serve as one piece of an overall line of defense, so long as it's managed correctly. Andersen Cheng, CEO of Post-Quantum, a provider security technologies, says it is crucial for firms to mix and match various methods of authentication to meet an optimum level of security. He says this can include factors like "what you know, what you have and what you are," which boils down to a password, static biometrics and behavioral biometrics.

"Using just one biometric or factor is very risky and you need to combine it with other factors," he says. "If you mix and match it becomes more difficult for an attacker." W

SALIENT POINTS

- The last 10 years has seen uptake of biometric technologies across the financial services and tech industries, and now investment firms are beginning to unlock the potential of these technologies as a layer of defense.
- As the technology becomes more sophisticated, firms are using AI and machine learning to create digital models of individuals using behavioral biometrics.
- Once biometric security systems are breached both the individual and the technology are compromised. Unlike traditional forms of security, it is not a matter of resetting a password.
- At time when the industry is experiencing an explosion of data, and firms are struggling to meet GDPR requirements, new questions are being raised surrounding the ethical use of biometrics data and the regulatory implications.

IHS Markit Overhauls Derivatives 'Nerve Center' with TradeServ Launch

MarkitServ executives sat down with *Waters* to preview its soon-to-be-launched TradeServ platform, which will be rolled out even as the firm is on the market to be sold. By Anthony Malakian with additional reporting by James Rundle

In May, after IHS Markit bought data specialist Ipreo, the company also announced its intention to divest MarkitServ, a platform which has been described as the nerve center of the post-trade market in derivatives, given that it handles 130,000 derivatives processing actions per day.

Traditionally, when a company is on the auction block it runs lean, it shines itself up and is wary to take risks. Why dump a ton of money into innovation when the future is so murky? With MarkitServ, IHS Markit is taking the opposite approach. On September 10, the company will launch TradeServ, a cloud-based platform that will eventually house its other platforms, including MarkitWire, Markit Trade Manager (MTM) and DSMatch. The platform-as-a-service (PaaS) offering is about four years in the making, and despite the potential for a future sale in the works, the way forward for MarkitServ—whether it remains with IHS Markit for the near-term or is sold to someone else in the coming months—will be in the cloud.

"We have always innovated—whether people knew it or not, we just did it," Bradford Levy, CEO of MarkitServ, tells *Waters*. "When you're selling, there's even more scrutiny on you, which is good. While the scrutiny is higher, we have to be even more clear with what we're doing and more committed to doing it right, just because people are

watching us. I love the fact that we've said we're selling. Obviously, it creates some stress, but it just makes us that much more watched and therefore we have to be that much better. And I've seen us rise to the occasion as a franchise so many times that I know we can do it."

The first rollout of TradeServ will begin on September 10 and will focus on foreign exchange (FX) for non-deliverable forwards (NDFs). As a conduit to LCH, MarkitServ handles the bulk of cleared NDF trades, and has recently been averaging processing volumes of just under 120,000 per month. The second phase will bring in FX options, which is expected to be launched in 2019.

The third phase will bring in credit. That launch date is targeted for the first half of 2019—and, loosely, for February—but that will depend, in part, on the Depository Trust & Clearing Corp. (DTCC). February is when the settlement specialist plans on going live with its Trade Information Warehouse (TIW) using distributed-ledger technology (DLT). TradeServ will connect with TIW, but MarkitServ can't go live with credit on the platform until the distributed ledger is up and running, though the launch will also require that MarkitServ is up to speed as well as industry participants.

"I'd argue that [TradeServ] is not a step forward from DSMatch and it's not a leapfrog—it's simply not comparable," Levy says. "TradeServ is a leapfrog over MarkitWire; MarkitWire is a monolith and TradeServ is our future PaaS offering."

Day One

The purpose of TradeServ, which is using Amazon Web Services (AWS) to host its cloud functionality, is to allow customers better access to their data to enable improved analytics, easier integrations and a customized user interface (UI) through automation. Easy enough said, harder still to deliver.

At its core, MarkitServ has two matching platforms: DSMatch for credit and FX; MarkitWire for rates and equities, which is a monolith that is plumbed into banks and clearing-houses across the globe. Markit Trade Manager (MTM) is specifically architected for the buy side, replete with its own dedicated interface. There is also its FX trade processing service, Dealhub, and its connectivity service, Trade STP, short for straight-through processing. This forms a network-of-networks; combined, the company covers everything from confirmation and routing, through to clearing, reporting and more.

TradeServ, which incorporates RESTful application programming interfaces (APIs), will eventually house all of MarkitServ's offerings, though that end-state is well down the road. Rather than do a complete relocation of the MarkitWire platform into TradeServ, the company is currently componentizing MarkitWire's various pieces so that they can be more easily fed into TradeServ over time—a process that could take up to five years, Levy estimates.

"We are not going to do a lift-and-shift from MarkitWire to TradeServ," Levy says. "Over time, you pick off the pieces and have a kernel of what you started with, and you never really lose old MarkitWire—that just becomes its own application living within a PaaS world."

> "We are not going to do a lift-and-shift from MarkitWire to TradeServ. Over time, you pick off the pieces and have a kernel of what you started with, and you never really lose old MarkitWire—that just becomes its own application living within a PaaS world."
> **Bradford Levy, MarkitServ**

The DSMatch replacement is expected to go live in the first half of 2019, with a rough launch date penciled in for February. DSMatch was built on a COBOL-powered mainframe and is decades old, hence the need for re-platforming. TradeServ will interface with the new distributed-ledger-based TIW. Once that platform is live and in production, MarkitServ will decommission DSMatch.

Improvements to MTM will include a streamlined trade-break resolution process, where, with the click of a button, a chat room pops up, it brings in the trade—as well as the parties that can resolve the trade—into a Symphony-like environment, and from there the entities hammer out the details at which point MarkitServ and client systems that are integrated are automatically updated. This allows users to cut out the hodgepodge workflow of phone, email and disconnected apps that don't provide context around the trade.

TradeServ will also allow for the firm to be more agile in responding to changes in the marketplace and allow for more experimentation, says Frank Tarsillo, managing director for architecture at IHS Markit. As of mid-August, two buy-side firms and two sell-side firms were using TradeServ in pilot form.

"This environment allows development teams to spin up, literally, their own entire stacks, with a hundred

microservices, in minutes. Because of that luxury, they are embracing testing," he says. "So they'll spin up the entire TradeServ environment—click, it shoves out 100 microservices and it's their own little world. That can be one developer—one tester—managing and running against one slice of that network. So there are 20 different environments that teams are testing off of for different aspects of the system. And that's fantastic."

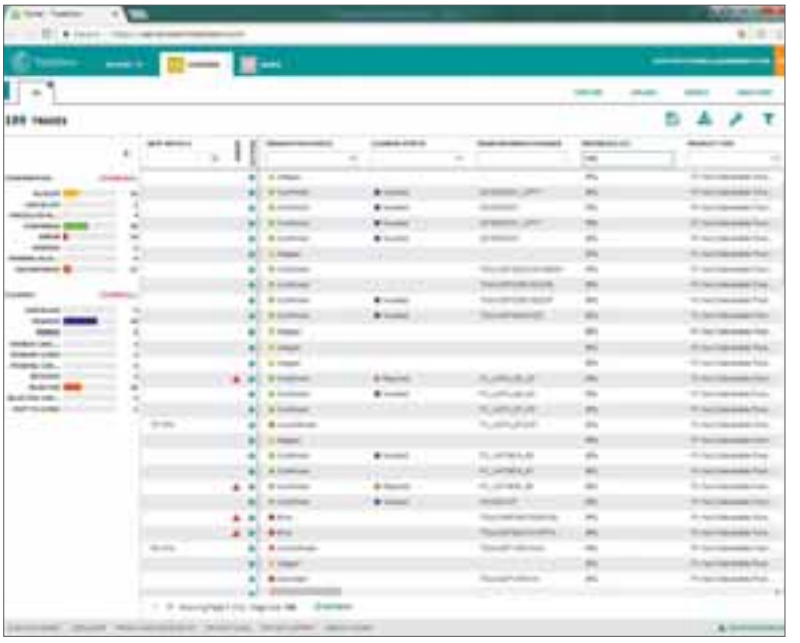
The most immediate change that users will notice on Day One will take place in the spheres of the platform's UI and workflow. It supports federated single sign-on, click-and-drag functionality, elastic search, and the ability to customize the information to each individual user's needs. The default set of columns is six, but users can add or remove columns and can move those columns left or right, as fits their needs.

So, for example, a user can create a view to see open trades for a particular client, another for unconfirmed trades against another client, another for all open trades, or just have those three particular columns in one view.

Users can see trade breaks and the platform lets them see the best match for a particular trade, using a percentage as to how sure the MarkitServ algorithms are to create a match. So, one match is listed at 80 percent confidence, two others at 70 percent, and so on, decreasing as confidence lessens. Users can click on those trades to see where the differences are.

"Every trade that comes through the system, we have to have a cache of all the trades so that for every trade we can figure out what their closest match is," Tarsillo says. "So it's scanning thousands and thousands of trades every time and coming up with the top 50 or 100 trades for each one of those activities. It's very hard to maintain that and scale that effectively across the network, and that's one of the benefits for the platform—the new matching system is scalable."

Frank Tarsillo
IHS Markit



MarkitServ's UI

Since this platform is designed to push MarkitServ into the future, there will be continued rollouts and enhancements, such as consent for novations and in the novation workflow, overall.

"There's still a decent amount of functionality that we need to build and then obviously test that," Levy says.

An Analytics Play

So what will future benefits entail? At present, MarkitServ is focused on getting through the next steps to enable TradeServ's future state. Currently, MarkitWire and MTM are being componentized so that they can eventually be "snapped" into TradeServ as an application—or a tab—inside of the larger TradeServ platform. Through a window in TradeServ, users will be able to bounce between the various MarkitServ offerings should they have multiple needs.

"The idea is that you can't actually evolve these things into one without making them similar technologies that are compatible," Tarsillo says. "By thinning out MarkitWire over the same time that we were building TradeServ out, we knew these things would eventually be able to join up in the end."

This process will involve moving the MarkitWire and MTM UIs into the TradeServ glass so that a user doesn't need to have multiple screens running. The backend services of MarkitWire—which includes over 20 years of IP development—will eventually become pieces in the TradeServ environment, Tarsillo says.

The company has yet to decide whether MarkitWire or MTM will be first to be aligned with the TradeServ platform. MTM, Tarsillo says, requires "a little bit of refactoring on the front-end, but the back-end would be relatively easy," while MarkitWire will require more work on the back-end "but the UI front-end is more easily snapped into this container."

Additionally, while users will immediately be able to customize their views, in the future they'll also be able to create templates that can be shared across the group to improve workflow. Also, as new regulations come down the pike, or as current regulations are amended—for instance, a new clearinghouse gets approved, or there's a

new product, a new index or a new currency pair being cleared, or some data update—those changes can be made almost immediately and across users, rather than today, where one feature change requires dozens of regression tests across numerous components.

Perhaps most interestingly for the future, TradeServ could help MarkitServ to offer a robust data analytics offering, Tarsillo says.

"We store all of the client's transactional data today—it's all there sitting in our world. What does the customer want? They want a copy of that data in their world. Why do they want a copy of that data in their world? They want it so they can perform analytics, scrubbing, whatever it is. This is high-compute that's required on the customer side," he says. "Well, we're all moving to the cloud and the cloud gives some general and physical advantages. Wouldn't it be interesting if we could segment, in the cloud, a safe space or a true sandbox for our customers to come into our environment in a secure setting, and query and look at the data in our environment directly?"

Essentially, MarkitServ would provide the analytics interface to the client's transactional data. This way, instead of the content being exported out to the customer, the customer would go into TradeServ and use the platform's logic and compute power to slice-and-dice the information in a secure, client-only sandbox.

"The customer says 'I want to perform analytics on my data.' I'm holding 20 years of their data. Instead of exporting the 20 years of data and doing the reconciliation, we'll give you a safe space in our world, come into our world, here's a bunch of APIs and ways you can access the data, we'll give you the compute—you can even bring in data to run against that dataset—you're optimizing the ability to actually compute information locally, versus bringing all that data down into your world."

Tarsillo is quick to point out that this is not yet an offering and that this would come well down the line, but it also highlights why this move toward PaaS is so vital. In today's environment, the data—and the ability to offer services around analyzing that data—is becoming increasingly valuable as end users want to be able to dig deeper into the data without making a massive internal investment in technology.

Regardless of whether MarkitServ will be acquired in the near future, or if MarkitServ, itself, acquires another firm, the idea will be that TradeServ will house any new offering going forward, so as to streamline its offering and allow it to move into new business arenas.

"The whole purpose of this platform is that you adhere to it as you move forward," Tarsillo says. "So if we acquired a new technology stack, I don't see a difficulty in morphing it into this new platform."

As this issue of Waters was going to press, IHS Markit announced that it would be canceling the sale of MarkitServ. ■

PROJECT VOLTRON: FROM MONOLITH TO MICROSERVICES

The MarkitWire stack is big and complicated, with over 20 years of development and IP underpinning it. What started as a confirmation system now includes clearing and reporting, and MarkitServ has put a lot of code into the monolith just to get the reporting piece completed—about 30 to 40 percent of MarkitWire code is for that, Levy estimates. The system had grown, through acquisition and development, to the point where it was unwieldy.

"We've been called plumbers in suits and I don't accept that—we're both electricians and plumbers," says Levy, partially joking, but also with some seriousness. "We're not just the flush, we're also the connectivity. We are liquidity. If you don't know your risk as a bank, you're not trading, and you're certainly not trading aggressively. So the moment you know you're good, you can then make your market for your next trade. And we allow people to know they're good immediately, and then to get it through their risk overnight. We used to be thought of as just the overnight-batch-guys, but with clearing and real-time flows, we are now plumbers and electricians."

MarkitServ started to see that the age of monolithic hardware and platforms was coming to an end, thanks to the cloud and through fintech disruption. The way forward was away from on-premises solutions toward PaaS, even if back in 2014, some of their clients didn't quite realize that just yet.

The idea for TradeServ came about four years ago in response to this, and its codename was inspired by a popular 1980s cartoon—Voltron. Broadly, Voltron is a giant robot comprised of five individual components—in this case, flying robot lions—that can fight both as individual machines but can also combine into one super flying robot that fights villains. What's technology without a bit of nerdom?

MarkitServ is not going to throw the baby out with the bathwater. True to its original codename, the vendor is peeling off those different pieces to create, say, a standalone reporting service that you could add into TradeServ without breaking any of the clearing or matching flows. Levy says that this process could take five years to complete and the next 24 months will be a full-scale effort to chip away and containerize those pieces.

"We industrialized our platform for a world that was going to be faster and have more volume. That was our focus from [about 2012]—industrialization and scale," Levy recalls. "Then, by 2014 and 2015, we started to develop a view that we both needed a brand-new platform that was cloud-friendly or PaaS, that [could offer] microservices and containerization. …But the world doesn't go modular and small quickly."

The move toward PaaS was also further pushed forward by the DTCC's decision to embrace DLT. MarkitServ wanted to take DSMatch in-house so that it was sitting in their world and, thus, they could better control its development. This would also help to bolster the idea that bringing the other various platforms under the MarkitServ umbrella would be better served if they were brought onto a unified platform.

"The end state is what's quite interesting here," Tarsillo says. "TradeServ was never about replacing DSMatch—that's just part of what it's going to do. It was about building something that could not only replace DSMatch but that could incorporate all the other assets that we had over time… it's the fabric of the platform that's being built that lays the groundwork for everything else we're going to do moving forward."

LEFT BEHIND: BUY-SIDE

Firms Face Age-Old Question on AI

When it comes to artificial intelligence, first-mover advantage is clear. But for buy-side firms that do not have the resources of global giants and are finding they are increasingly unable to compete, it becomes a tough question—do you trust third-party providers to do it for you, or invest in something that may not return what you hope? By James Rundle

"Technology is changing too quickly for us," sighed the head of IT at a US-based family office, while taking a break from SS&C Technologies' annual client conference in September at Las Vegas' Wynn casino. In the 100-degree heat of Nevada in late summer, the topic of conversation throughout the entire event tended toward artificial intelligence, machine learning and other emerging technologies, but for some, they may as well have been talking about fairy dust.

"We've only just got [SS&C's back-office platform] Geneva," the IT head continued, while stubbing a hand-rolled cigarette out amid plumes of smoke from electronic vaping devices. "I don't even know how I'd begin getting the budget to hire mathletes and machine-learning specialists."

It's a common problem for many on the smaller end of the buy side, who do not have the staff, the budget, or even the inclination to pursue emerging technologies like AI. While an arms race continues to heat up between the largest or the most tech-savvy global firms as to which datasets can be analyzed and inform a trading strategy before they go stale, many sub-$10 billion asset managers are content to sit back

> "The beauty is that, today, there are a lot of service providers out there and you don't have to build stuff for yourself anymore. There are things that you can and should, but working with service providers, you can outsource a lot of that. This enables smaller companies to be able to do things that probably, a few years ago, they had to build for themselves."
> **Steven Miyao, SS&C Technologies**

and let them fight it out—mostly because they have little choice in the matter, even as they admit subsets of AI will become standard in the not-too-distant future.

AI as a Solution, Not a Problem

To understand why AI's various subsets—machine learning, natural-language generation and processing, robotic process automation (RPA) and others—are becoming so important to the buy side necessitates a knowledge of the current environment. Much has been written about diminishing returns from traditional strategies, and the appetites of investors switching from active management to the passive profits of exchange-traded funds and index trackers, for instance.

But there are also other worrying signs of stagnation—a generally flat number of family offices and smaller funds or asset-management firms opening year-on-year, without any significant growth, is one. The consolidation in the providers of technology to buy-side firms, as seen with State Street's acquisition of Charles River, and SS&C's subsequent purchase of Eze Software, which is due to close in October, is another.

The use of alternative data, in particular, has emerged as a sweetheart topic for many shops. The idea is that if the vast morass of data out there on any number of topics can be wrangled and organized into some form of coherent structure, patterns can be discerned that can lead to alpha, for those with keen eyes. For instance, while the example of counting cars in mall parking lots as a gauge of, say, a commercial real estate investment trust's performance is well-known, enterprising firms are also tying together seemingly disparate elements, like aluminium stockpiles at factories that serve in the supply chain for toy companies, in order to predict box-office performances of major films, using the level of merchandizing as a proxy.

All of this requires AI. Humans simply cannot analyze all of that information quickly enough to make a difference. That's all well and good for the small tech-powered buy-side firm in Hoboken, with 20 PhDs on staff, or the really sophisticated heavy-hitters. But even for those with the nous, keeping up with the capabilities can be an issue. Outside of alternative data, however, the justification for engaging in AI research and the return on investment can sometimes be more difficult to ascertain.

"Over the last four years, we spent a good bit of time addressing issues related to optimizing scaling within our operations," says David Sharpe, managing director and director of operations for Fortress Investment Group's credit business. "The challenge we have at Fortress is that we're not a shop that's going to have 3,000 trades per day, so identifying large-scale operational efficiencies is tough for us, in that a lot of what we do is fairly bespoke. We went to a lot of conferences, a lot of panels, and walked away thinking it would be great to use RPA but we're not sure how relevant it would be. It took some of that frustration to think about how we could identify opportunities within operations that would be more suited."

In the past six to eight months, Sharpe says, the alternative asset manager has put a number of components into production. Most early work, as with many other firms, had focused on RPA—a means of automating repetitive, rules-based processes that have usually been performed by humans in the past. From there it shifted into more advanced forms of AI, such as machine learning.

It's a starting point for most firms, most of which say that AI tends to be the natural solution to many problems for their clients.

"Our clients are financial advisers and are not usually [early adopters of technology]. I don't get a lot of questions about AI, aside from asking what it is," says Dani Fava, director of institutional product strategy and development at TD Ameritrade. "An advisor will call up and ask how they can get a client to stop calling and asking them about the status of their paperwork—we

have chat bots, we have RPA behind the scenes processing these workflows. The questions we're getting from clients are ones that lead us to AI solutions."

RPA is relatively simple to put in place, even if banks such as Societe Generale and others have generally found it to be flawed for their purposes. It is, after all, essentially a glorified macro—what truly differentiates machine learning is the ability for that macro to teach itself how to do something that it wasn't programmed for. That's where the real value—and the cost, as well as unforeseen issues—comes into play.

Resource Management

"This is a business of returns," remarks a head of another family office based in Florida. "I can't afford to waste money on experimenting—show me that it will add to my bottom line, or that I have to do it, and I'll invest in it. We leave the tinkering to people who do that for a living."

While defensive, this reaction also sums up many of the issues at play with smaller firms—AI is an unproven technology, at its core, and there are more than enough demands on firms already. This is true even for the sell side, which has traditionally led in emerging-technology development. A recent study by Gresham Technologies and the Financial Industry Markets Association, for instance, found that while the respondents were exploring the use of AI heavily, data management projects were seen as a higher priority by the vast majority—around 89 percent.

AI also doesn't happen in a vacuum, where a firm can decide one day to download a developer kit from Google and be up and running. It requires organized and well-managed data structures, as well as a trifecta of talent which can often be difficult to attract.

"Essentially, you have the three core people involved—one who understands the business problem, and that's the most important person," says Steven Miyao, president, AI and analytics, research and compliance solutions at SS&C Technologies. "That person needs to understand the industry, to have been in it, and exactly what the problem is. Then you need the actual data scientists, the people who can write Python and handle the advanced mathematics. But you also need someone in the middle who can translate between the business person and the data scientist."

So what are the solutions for cash-strapped—or, at least, cash-conscious—firms that are unwilling or unable to invest in AI? One approach is, of course, to leave it to systems providers, many of which have dedicated research and development arms, labs, innovation hubs and other such initiatives in place already. Eventually that technology will filter down into the products used by firms, although as Fortress' Sharpe says, that doesn't really help those businesses whose requirements tend toward the bespoke.

"The beauty is that, today, there are a lot of service providers out there and you don't have to build stuff for yourself anymore," says SS&C's Miyao. "There are things that you can and should, but working with service providers, you can outsource a lot of that. This enables smaller companies to be able to do things that probably, a few years ago, they had to build for themselves."

David Easthope, a senior vice president at research firm Celent, agrees, saying that third-party providers are "all over this."

"Machine learning is something they really want to do. So you can rely on your third parties and systems integrators to do this," he adds.

This is likely to be the approach taken by many firms, even for alternative data analysis—the head of the family office asks *Waters* if we "truly believe FactSet and Bloomberg won't be giving me this stuff in a few years"—but another route is the appointment of an advisory board, particularly if a firm is sensitive to compliance concerns. TD Ameritrade's Fava, for instance, recalls one of the earliest of the firm's experiments in AI was when the emerging technology division synthesized the CEO's voice. Once the compliance department heard about it, she says, they came down on them like "hellfire."

> "An advisor will call up and ask how they can get a client to stop calling and asking them about the status of their paperwork—we have chat bots, we have RPA behind the scenes processing these workflows. The questions we're getting from clients are ones that lead us to AI solutions." Dani Fava, TD Ameritrade

Dani Fava
TD Ameritrade

Others are using such mechanisms to sound out the market before diving in. Last year, Andrew Powers, head of IT at Florida-headquartered Polen Capital, told *Waters* that the firm had done just that, to avoid going full-bore on technologies that may end up being irrelevant.

"We'll be ready to adopt it, but it has to become accepted by the industry, the regulators, and everybody like that first," he said, adding that he wasn't certain AI was as applicable to his firm, which has a very defined investment style, as it was to those that engaged in factor-based investing.

As the head of IT at the US family office said at the beginning, trying to keep pace with the head of the pack is not always the wisest move. For those unable to compete on this playing field, slow and steady might yet win the race—even if it takes a while to get there.

"Technology always seems to move both faster and slower than you think," said Powers. "Sometimes things happen and you're left wondering how they happened so fast, but when you're actually going through it, it seems to take a really long time."

However, it is going to be tough for those who do not invest, or who actively avoid engaging, to continue to compete. Fortress's Sharpe says the firm is looking at "trade capture, confirmation and settlement across all asset classes, and how we can use machine learning to facilitate those for us," and predicts that in the alternatives space, many firms will be using RPA as a spring board to then go into machine learning. TD Ameritrade's Fava says that AI will eventually shape the future of asset allocation, which should set alarm bells ringing among smaller shops dependent on a few key accounts.

Ultimately, however, it comes down to a decision on whether AI is a must-have, or a nice-to-have. That, most say, depends on each firm's individual goals, and while Fava describes it as "critical" and "unavoidable" in the future, others suggest there is still an element of choice.

"It depends on your motivation," says Fortress' Sharpe. "If the internal motivation is cost avoidance then it's probably a must-have. The sell side is pushing it, but there's a bit of a gray line between a nice-to-have and a must-have." W

SALIENT POINTS

- While AI is a subject of extreme interest for many on the buy side, not everyone has the resources to invest in their own bespoke research and development.
- These firms will likely be forced to rely on third-party vendors or the sell side to access and use this technology.
- Robotics offers a relatively easy entry point, as do advisory boards, but decisions need to be made quickly on whether to engage.

Ryusuke Yokoyama sits down with Wei-Shen Wong to discuss his three-decade career at the TSE and JPX, how the exchange is looking to help the industry improve its settlement cycles and how the company is experimenting with blockchain and AI technologies. Photos by Richard Atrero de Guzman

On the 14th floor of

Japan Exchange Group's (JPX's) headquarters, situated in Japan's largest financial district, Kabuto-cho, Ryusuke Yokoyama, dressed in a dark blue-grey suit paired with a royal purple tie, walks into the meeting room with a smile. He speaks English, but prefers to conduct this interview in Japanese. Seiko Takagi from JPX's IT development department, as well as Mio Nishino and Shinichi Yaguchi from JPX's communications department, are on hand to translate.

Yokoyama is the chief information officer (CIO) of Japan Exchange Group (JPX), which came into existence in 2013 after the Tokyo Stock Exchange (TSE) merged with the Osaka Exchange (OSE). He is a TSE lifer, having joined the company in 1986 straight out of university.

It is not every day you meet a C-level executive who has spent his or her entire career at one company. This may seem like a rarity in most places, but not in Japan, where, until fairly recently, this was considered normal.

Back when he first joined TSE, the exchange's mindset and approach to IT was very different than it is today. He says a small portion of the business utilized technology at the time—about 30 percent, he estimates. It also didn't have the executive CIO role, similar to the majority of other Japanese companies at that time. Fast forward some three decades and he says that about 90 percent of the company utilizes tech and, clearly, the CIO role is alive and well.

Although his goal had always been to work in finance, he was not particularly interested in IT originally, and never imagined that he would climb to such a lofty technologist role at one of the world's largest exchanges.

A Dramatic Change

Yokoyama, 55, says that in many ways, transitioning to an IT-focused organization was not easy, and it took time to get acclimated to the life of a technologist. The

The New Guard

Ryusuke Yokoyama
JPX

IT team experienced change gradually, and slowly began adding in numbers and responsibilities.

To illustrate the jarring change that the then-TSE experienced in becoming a technology-driven organization, one only needs to look at the JPX's trading floor today. Back in 1999, the TSE decommissioned its trading floor to facilitate its move to electronic trading for all transactions. Today, visitors to the exchange's headquarters see a vacant room, save for a few staff typing away in a row of otherwise empty seats. The halls around the trading center are eerily quiet, soundtracked only by the low hum of servers and air conditioning.

Yet the exchange wasn't done evolving. A dramatic change needed to happen after it experienced a series of serious system failures in late 2005 into early 2006. This included operational failures from a system upgrade by Fujitsu, whose systems were newly installed to help cope with higher trading volumes. Then, a fat-finger trading error occurred involving Japanese brokerage Mizuho Securities, resulting in a net loss of $347 million and the resignation of some senior executives. Later on during that period, TSE had to shut its systems early as it was threatened by trading volumes that encroached upon the system's capacity.

At that time, Yokoyama was stationed in the IT planning department, which oversees the IT strategy of the entire company, and coordinates with other planning and strategy teams. The department was specifically tasked with making business continuity plans (BCP) for the exchange, and had to answer to a business improvement order by the Japan Financial Services Agency (JFSA) after the system failures.

Yokoyama says the team busied itself responding to the JFSA's order. "I didn't have time to stop and think about what actually caused these problems but now, in hindsight, I think the problem was caused by the big gap of awareness of IT between the exchange side and the market participants," he says. "We just didn't know how important IT was for the exchange business. But on the other hand, market participants utilized IT quite a lot for trading and clearing. So there is a gap in awareness and looking back, I think that caused those big IT issues."

This led to the exchange reaching out, in 2006, to Yoshinori Suzuki, who was working for Nippon Telegraph & Telephone (NTT), a telecom company, to help the TSE as a CIO. Suzuki became the first CIO at TSE and implemented reforms that took measures to improve the system quality of the exchange.

Yokoyama believes the exchange's system quality has been vastly improved over the last decade-plus. This confidence has been fueled by Suzuki's work as well as by former JPX CEO Atsushi Saito. Saito was the first JPX CEO after the merger between TSE and OSE and instilled a customer-first mindset into the company.

"He put great importance on [having an open] dialogue with customers. He talked to the major global players—high-frequency traders, securities firms, and so on, and through that dialogue, he got an idea of what those companies think about daily and what they require from us in terms of IT solutions at the exchange," says Yokoyama.

These two people—Suzuki and Saito—have had a great influence on Yokoyama's career. He worked as Saito's secretary for two years and, as a result, closely with him. During Suzuki's time as CIO, Yokoyama was in the IT planning department and reported directly to him.

"This is not limited to IT, but from Saito, I learned the customer-first mindset. He said that JPX has all sorts of customers so we need to listen to their voice and respond to that. And from Suzuki, I learned the importance of system quality and how to enhance it," he says.

Yokoyama has taken these lessons from Suzuki and Saito and has worked to create an ethos of improving the exchange's IT while always having customer needs in mind.

Old and New Technologies

Of the many moves JPX—which, in addition to the TSE and OSE, includes the Japan Exchange Regulation (JPX-R), its market-oversight function, and Japan Securities Clearing Corp. (JSCC)—is making, one of larger recent upgrades involved settlement times. Earlier this year, JPX shortened the settlement cycle of Japanese Government Bonds (JGB) from T+2 to T+1. Similarly, it aims to shorten the stock settlement cycle from T+3 to T+2 next year, in line with various other major global settlement cycles—the US transitioned to the T+2 standard in 2017 and Europe has been on that settlement cycle for some years now.

Yokoyama expects this to have a big impact on the industry and will be making some adjustments to JPX's clearing systems to address that. "In

"In order to both maintain and improve the quality of the system, I try to maximize the power of the team as a coach or manager. That's how my passion for football can be utilized for my work."

order to shorten the settlement cycle, it is necessary to take measures such as correcting the timing of information linkage between each of our systems. In addition to such system compliance, participants will also have to change administrative procedures," he says.

The exchange group is also making moves to upgrade its cash equities trading system—Arrowhead—which was introduced in 2010 and last underwent an upgrade in 2015. The third generation of the system will be launched next year and will introduce sequential trade quotes to improve customer convenience in the event of sharp price movements.

Both Arrowhead and J-Gate, JPX's derivatives trading system, are in a five-year replacement cycle, but the timing of this cycle might change due to new technologies, Yokoyama says. Although the platforms have performed well, he says, this injection of new technologies in the financial industry may lead to further, perhaps significant, changes for the exchange itself.

"If you make me start talking about blockchain, it will take me a very long time. I have a lot to say about blockchain," says Yokoyama.

Although JPX has been experimenting with distributed-ledger technology (DLT) to see what kind of businesses can be processed by the blockchain platform, it has not yet reached the production stage. For many interested parties, the appeal of blockchain has been the fact that there is no need for a centralized or intermediary party to conduct transactions of any kind. Yokoyama believes this is not the case.

"Even if we use blockchain, the central entity as a supervisor will be needed. In that sense, JPX and JSCC will have a role even if we have a blockchain platform," he says. "We see blockchain having potential in the post-trade area," and future IT rollouts could be built using blockchain technology, but he believes they should be facilitated by a neutral intermediary.

JPX is working together with the industry to publish JPX Working Papers, drawing comments from academia, research institutions and other market participants on changes in the market and regulatory environment. The group has published a few studying the applicability of DLT to areas such as trade matching processes and capital markets infrastructure, among others.

Yokoyama says blockchain is just one component, one type of database. "We have [the] Oracle database, big data database, and similarly, we will also have blockchain databases. We think it should be used in a suitable place, a suitable database in a suitable place," he says.

And, of course, you can't talk about "new technologies" without discussing artificial intelligence (AI). JPX has begun applying AI techniques to its market surveillance operations. JPX-R deployed two AI-powered technologies in March 2018 using NEC Corp.'s Rapid Machine Learning and Hitachi's AI Technology/H to help evaluate irregularities in trade activities.

These technologies will assist surveillance personnel to complete preliminary investigations more quickly and focus on detailed investigations.

While the final decisions on investigations are still made by surveillance personnel, the initiative facilitates more in-depth and detailed investigations and is expected to improve market-monitoring functions.

Keeping the Lights On

While blockchain and AI are popular topics, companies operating in Japan must keep an eye on more practical IT issues. Japan often experiences earthquakes as it is located where several continental and oceanic plates meet, which is why having an all-encompassing BCP in place is vital. JPX is in the midst of moving its secondary datacenter to the Kansai region, which is located in the mid-south of Japan and includes Osaka, Kobe and Kyoto. Currently, both its main datacenter and backup datacenter are located in the Kanto region, where Tokyo is located.

The new secondary datacenter was a result of recommendations by the exchange's technical committee—comprised of representatives of TSE and other market participants—to have the backup datacenter in a more remote location that is subject to different risks than the main datacenter. The committee highlighted concerns that the current backup plan does not cover a situation where the primary datacenter and the backup datacenter are simultaneously damaged by a disaster.

The exchange plans to incorporate systems for trading and other functions into the system architecture at the new backup datacenter in stages, to match the replacement schedule of other systems, such as its Arrowhead and J-Gate platforms, as well as its clearing systems.

Yokoyama says once the Kansai backup center is complete, JPX will decommission the backup datacenter in Kanto. He estimates that works for the new backup datacenter will be complete in 2022, but plans for it have not been fully formulated, so that timeline might change.

One of the projects Yokoyama takes pride in is enabling remote operations of both the primary and backup datacenters for TSE and OSE. Yokoyama says even in the case where both the primary and backup datacenters are not damaged by an earthquake, it might be difficult for staff in the operations team to physically go to the datacenters.

"In order to prepare for that, we put in place a remote operational system that allows us to operate both the primary and backup datacenters for TSE and OSE," he says.

The exchange has teams monitoring and operating the system 24/7/365 and has another team in Kansai that is able to carry out operations remotely to connect the datacenters. Only in emergency cases, the teams might face difficulties. "If it's only an emergency, they might not be able to do proper operations. Even normally, we do rotation. Sometimes the Kansai team will do the operations while the Kanto team takes a rest and vice versa," he says. "I can say that we have better BCP than we've had before, but when the Kansai datacenter is completed, we will have even better BCP."

Player–Coach

Yokoyama is an avid fan of football—or soccer, as Americans prefer to refer to the sport. He finds beauty in the tactics and teamwork necessary to produce a winning result. He follows Italy's Serie A league closely and is a fan of Juventus FC. He also follows the Japanese Football League and goes at least once every two weeks to watch Yokohama Football Club matches at the NHK Spring Mitsuzawa Football Stadium in Kanagawa-ku, Yokohama. And one memorable trip to England for Yokoyama saw him catch a Barclays Premier League match between Manchester United and Chelsea at the legendary Old Trafford stadium, three years ago.

He has tried to imbue some of the managerial tactics used in football into his own leadership style. He notes that successful system development cannot be a one-person job—it takes a team working in tandem.

"In order to both maintain and improve the quality of the system, I try to maximize the power of the team as a coach or manager," he says. "That's how my passion for football can be utilized for my work." W

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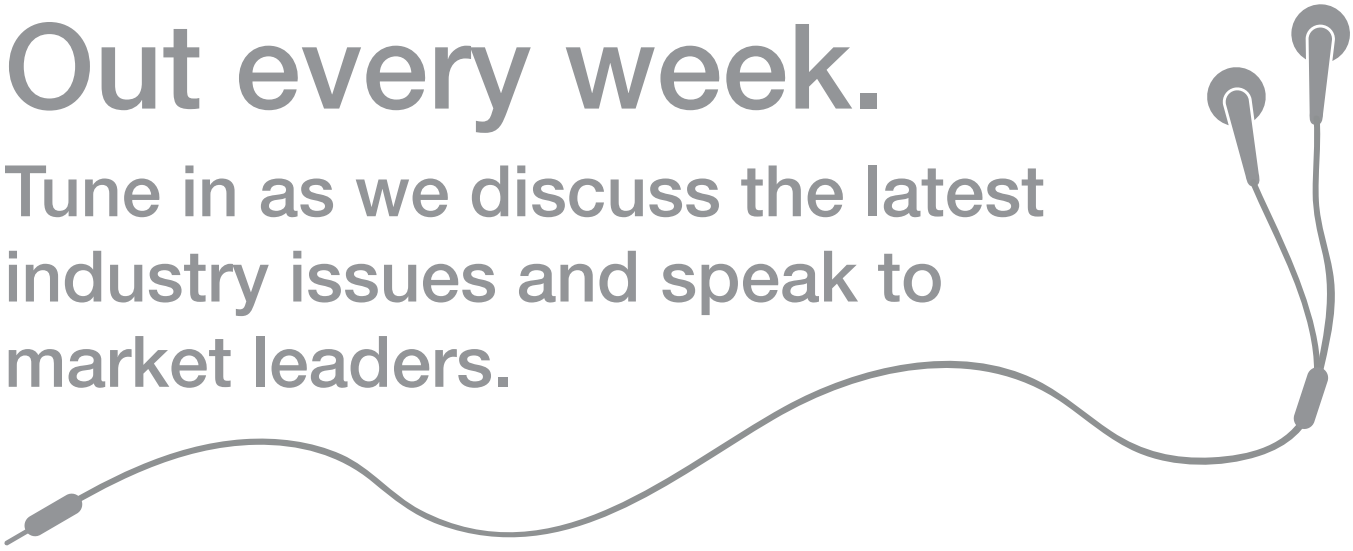

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Mind Your Language: Surveillance Systems Tackle Conduct Risk

While advanced voice analytics technologies have been around for years, banks have often used them as a blunt instrument, or a regulatory checkbox. Now they are increasingly seeing them as useful tools for managing conduct risk and employee protection. By Hamad Ali

For years, voice surveillance has been an integral tool for keeping tabs on traders' activities. Whether for regulatory compliance or fraud detection, advanced analytical software has been deployed across all major banks to pick out bad apples from the market.

Now, sophisticated voice technologies are letting banks go a step further to look at and analyze behaviors more commonly associated with conduct risk. Partly, this is being driven by external pressures on the financial services sectors, such as the UK's Senior Managers Regime (SMR) from the Financial Conduct Authority (FCA) which first came into force at banks in 2016, as well as the global #MeToo campaign, which encourages victims of sexual abuse to speak up.

Demand around the ability to study the deep complexity of human interaction and accurately alert banks to potential conduct risk scenarios is rising. Recently, Madrid-based surveillance provider Fonetic reported a 20 percent increase in requests from banks to address conduct risk by monitoring calls and chats between traders and other employees, compared with the previous year.

"We have been developing new policies about profanity recently," says a source at a tier-one bank. "In

"We build profiles about the way people communicate, who they are communicating with, the types of things that we hear in the conversation, and we start to analyze those conversations to look for changes in those behaviors, or deviations from the norm."
Steve LaGalbo, Nice Actimize

the past we also did [monitoring of] some non-authorized trading activities. That is our main field. Non-authorized could be from no proper language used, or about a client, or an activity in block trading, or market abuse, or whatever is not authorized by internal policy."

Language Barriers

It might sound odd for a bank to be interested in monitoring employees using profanity. While swear words show lack of professionalism, does it really merit such a high-level scrutiny?

"If you see the latest fraud misconduct, like [Libor, the London Interbank Offered Rate] or the foreign-exchange (FX) scandal, what we notice is the language around this non-authorized activity sometimes was full of profanity," says the bank source. "There is a sort of language that is sort of bullish that sometimes is correlated. Not always, but sometimes it is correlated to this misconduct."

The scandal over the rigging of foreign exchange markets and reference rates resulted in hefty fines for major banks such as UBS, JPMorgan, Citigroup, Barclays, and Bank of America. One of the behaviors that was noted about the traders involved in the scandal, and published by regulators in all its lurid verbatim detail, was their use of swear words in private chat room conversations.

"With the FX scandal, you notice when they speak together, they use bad words," says the bank source. "They use slang words. I don't know why, because they are educated people, but when they do sometimes it is sort of a bullish conversation. I am not saying it is always the case, but it is also another element that you want to consider once you are building up your policy."

Perhaps more destructive than the financial penalties, most of which were severe, but ultimately easily absorbed by the penalized institutions, was the reputational damage they incurred. It couldn't have come at a worse time—following the financial crisis and global protests by another largely online-organized element in the form of the Occupy protests, the reputation of the financial services industry sunk to an all-time low. Evidence that bank personnel had deliberately fixed rates on which everyday citizens depended for their mortgage payments was akin to being kicked while they were down.

Now, reputational scandal threatens to rear its head again. While the brunt of the #MeToo campaign has been felt in entertainment, media and politics, the financial services industry has been no stranger to scandal in this region either, whether that's accusations of sexual assault by staff at major banks, or through exposés such as the *Financial Times* sending undercover reporters to the Presidents Club dinners.

Jane Walshe
Enforced

The use of communications-monitoring software to guard against harassment, bullying and assault—something the industry has long been accused of but rarely confronted—is in its infancy, the bank executive says. But it is being investigated.

"Definitely we see in the policy there are opportunities also to use it for this, and definitely this is something that the bank will have to look into in more detail. We notice that there are things happening on this side in the communications," the source says.

Abnormal Behavior

One of the top players in the surveillance space is Nice Actimize, which counts tier-one banks and other buy-side and sell-side firms among its clients. Steve LaGalbo is the director for communications surveillance at the firm. He explains that it was around the time of Dodd–Frank—the 2010 US banking rules that came into force after the Global Financial Crisis—that regulators started demanding that financial services firms to take more proactive measures to monitor voice conversations.

"We created a solution that had the ability to connect to our Nice recording platform to analyze those phone calls, and to potentially uncover some risky conversations based on the conversation topics that were identified," he says.

Over several years, Nice has evolved its product to be more of

a complete surveillance platform, combining the electronic and voice communications surveillance capabilities into one product. "We are aggregating all the data from the trading activity, communications activity—including voice and other profile details—that helps us to understand what we call abnormal behaviors. We build profiles about the way people communicate, who they are communicating with, the types of things that we hear in the conversation, and we start to analyze those conversations to look for changes in those behaviors, or deviations from the norm."

The idea is to look for anomalous individuals that are behaving abnormally, leveraging the data and analytics from Nice's platform to give compliance teams a way to look at their environments in different ways to uncover conduct risk.

LaGalbo gives the example of Libor, monitoring the benchmark rate setting periods for the various currencies. In the old way of doing things, an analyst could just look at keywords or phrases that people might say that could suggest there is something suspicious going on. But what if the conversation is taken offline? What if there was no way of actually picking up what a trader says?

"If we are looking at behaviors, and having all of this data in our solution, we could see that people involved in this activity always use certain chat communications," says LaGalbo. "They always send a number of emails. They have a certain number of phone calls. There is a normal pattern of behavior for people to conduct business. Now if all of a sudden you have a trader who is not using their communication channels like everyone else—for example, they don't use their phone at all, so during this critical time of business this particular individual is not using their phone and everybody else is—that is kind of suspicious behavior and could be a potential risk."

Saeed Patel
Irisium

Nice uses transcription capabilities to convert everything that is spoken in the conversations to text. It also has analytics that highlight the concepts, the topics of discussion, and the sentiment—whether it is a positive or negative type of conversation. "If they want to look for conversations that have business context, they can very easily do that. If they want to look for conversations that might be suggesting somebody is harassing somebody based on some sexual misconduct language, then that is very well possible as well. Those types of analysis are done on phone conversations and can be highlighted as potential conduct risk."

> "Sexism is now less present in trader speech. What could that mean? I don't know. But it could mean that now traders know a real team is monitoring their conversation and they are starting to behave slightly better, let's say." **Juan Diego Martin, Fonetic**

While he says he has not had many inquiries on harassment, LaGalbo points out he doesn't have 100 percent visibility as to how the customer is using the platform. "They could very well be leveraging our advanced contextual search capabilities on voice to be able to look for conversations that might include topics that suggest there is that sort of negative conduct happening," he says.

Fit-and-Proper

The growth in the conduct risk space is attracting more players. Cloud9 Technologies, for instance, uses emerging technologies such as natural-language processing to power keyword spotting, which when paired with metadata such as who is on a call, how long it lasts, and similar information, can power a surveillance function.

"It also covers sentiment analysis, for example whether or not the tone of this person is one of anger or one of frustration," says German Soto Sanchez, president at Cloud9.

Irisium, another surveillance provider partly owned by KRM22 and Cinnober, focuses primarily on market surveillance solutions to ensure that firms can comply with their regulatory obligations. In 2019, it is launching new capabilities that will include communications surveillance, covering both electronic and voice communications.

"Irisium has been watching very closely the development of the regulatory requirements on conduct risk specifically," says Saeed Patel, direct of product strategy at the firm. "The FCA in the UK is the first major regulator to move toward having completely new conduct rules associated with senior managers and actually having a new individual accountability regime in place."

While the SMR was designed in the wake of the FX and rate-rigging scandals, regulators have definitively placed interpersonal conduct in the crosshairs as well.

Recently there have been quite a few high-profile cases involving senior executives at banks who have been dismissed over sexual harassment, and the financial sector seems to be taking more notice.

"[FCA supervision director] Megan Butler has confirmed that the new Senior Managers Regime will include allegations of sexual misconduct among the factors that look at whether or not someone is fit and proper to work in financial services," says Jane Walshe, co-founder and CEO of regulatory intelligence firm Enforced, referring to comments made by Butler in May 2018 to the UK Parliament's Women and Equalities Committee, in which she said the definition of "fit and proper" persons—a key definition under which someone or something is licensed to operate within the financial markets—would incorporate not just financial decision-making, but also culture.

Yet at the same time as it has seen an uptake in requests from banks, Fonetic is also seeing a reduction in alerts. "Sexism is now less present in trader speech," says COO Juan Diego Martin. "What could that mean? I don't know. But it could mean that now traders know a real team is monitoring their conversation and they are starting to behave slightly better, let's say."

The question is whether this has resulted in clear-cut cases that banks can pursue. The bank source, like others spoken to for this article, remains tight-lipped about the details, but says it has borne fruit.

"This is confidential information," they say. "We do use it, and we do have some results. But I can't talk you through internal cases." W

SALIENT POINTS

- There has been a 20 percent increase in banks addressing conduct risk through monitoring calls and chats, according to findings by surveillance provider Fonetic.
- Risk areas under the spotlight are sexual harassment, linked to the #MeToo campaign, and profanity, which has been linked to cases like Libor.
- The Financial Conduct Authority's (FCA's) Senior Managers Regime will include sexual misconduct among factors on whether someone is "fit-and-proper" to work in financial services.

The Fast and the Curious:

The Latency Barrier for Institutional Crypto Traders

Institutional investors want to enter the crypto space but the lack of infrastructure around guaranteed latency and access to real-time market data is hindering a wider entry into the field. By Emilia David

Banks and hedge funds have traditionally looked at cryptocurrencies with a large amount of skepticism, but in the past few years, interest in the space has ratcheted up. With increased interest comes a lot of pressure on crypto exchanges to prove they meet institutional investors' exacting requirements.

Digital currency exchanges (DCEs) are where cryptocurrency trading happens, where the market data lies, and in some cases where the money lives, as is the case with traditional exchanges. And this wild new world is attracting prospectors. Institutional investors—hedge funds, traders from banks, and high-frequency firms—are interested in the possibilities crypto assets hold. But they are not without risks.

DCEs don't necessarily have the guaranteed latency and access to real-time market data that institutional investors want before they're able to participate in the market. And with the crypto space heating up, these investors are more interested than ever in expanding into the market, so concerns over latency and execution might just scare them away. As the market grows, any exchange that wants to attract

"Frankly all these new exchanges that come online, pretty much nobody has a physical location, so everyone's on a cloud-based server and we're fine as long as we know we're not slower than other institutional trading firms."
Ricky Li, Altonomy

hedge funds and high-frequency traders, and scale up the market may need to look closely at their network infrastructure.

"If everyone is on the same ship, it's fine for us. What I worry about is if I'm slower than my competitors," says Ricky Li, founder of crypto-trading firm Altonomy. "Frankly all these new exchanges that come online, pretty much nobody has a physical location, so everyone's on a cloud-based server and we're fine as long as we know we're not slower than other institutional trading firms."

Volatility Protection

The cryptocurrency market is considered a highly volatile one with prices fluctuating wildly from day to day. Last year's bitcoin surge, which saw bitcoin reach a high of $19,783 in December—at the time of writing it sat at around $6,000—is a prime example. In such a market, the protection of guaranteed latency at least ensures spreads are not too wide, and the executed price does not vary so traders are not vulnerable to being picked off through arbitrage.

The number of DCEs has also exploded in the past few years. Some estimates put the number around 500, although there is no official documentation on the number of current exchanges, many of which operate in an effectively unregulated fashion. Major players like Gemini, which was started by the Winklevoss twins; Coinbase; Houbi; Bitfinex; Binance; itBit; and Kraken offer the deepest markets and have the largest volume traded.

Despite the inherent risk in the volatility, institutional investors have expressed a lot of interest in the market, according to Scott Freeman, co-founder and partner at crypto trading firm JST Systems.

"There actually are not a lot of institutional investors already in the market, they're more just looking at it. If you have a $1 billion hedge fund it doesn't make sense if you only do a small amount so you want the solutions that work so you can trade in amounts you want," Freeman says.

These investors understand that more must be done to ensure prices remain fair but some are willing to take chances now and get in while the market is still developing. Many agree, however, that the market will grow if DCEs offer services specific to institutional investors, like guaranteed latency and granular market data.

Andy Flatt
Archax

Altonomy's Li says institutional investors looking to enter the market are more comfortable if exchanges have better infrastructure, but for now it will do. That patience, however, has its limits.

"Right now, trading activity is not at the level of commodities or equities, so we're still fine even with the infrastructure issues," Li says. "They all know that soon they will need to host servers and need those infrastructures to be able to scale like the commodities and equities market."

Crypto exchanges choose where to be hosted, either through cloud-based networks or in a datacenter, much like more traditional exchanges. Volatility in the crypto space, however, brings with it more challenges. In a more traditional setting, investors seek guaranteed latency—that is a set speed at which trades do not bounce around the many different servers set up—so they're assured prices have not changed too much once the deal is done. High-frequency traders in particular value low-latency models as their algorithms are specifically written to take advantage of this speed. In a more stable market, a little slowdown normally does not affect prices but in a volatile market, a nanosecond can mean the difference between a $1,000 mistake and a $1 million one.

Scaling Up the Market

Institutional investors want to make sure the trades they execute are not subject to rapidly changing prices, and value this stability. Any DCE offering these services could have a strong competitive advantage in this segment of the market, which wields a lot influence.

This has led many established exchanges to set up institutional investor-focused infrastructure. Coinbase—one of the most well-known DCEs—announced in May that it was setting up an electronic

marketplace specifically for institutional investors. It will offer co-location in a datacenter and set up an office in Chicago. And Coinbase is not the only exchange making datacenter moves. Gemini and Bitfinex have also announced co-location strategies, either by physically co-locating customers next to their matching engines, or using an application programming interface (API) to connect to datacenters, in a bid to attract institutional investors.

Gemini, Coinbase and Bitfinex did not respond to multiple requests for comment.

However, crypto trading platform Quione's CTO, Ray Hennessy, says that as trade volumes increase, this lack of infrastructure could be an issue.

"To ensure the ability to effectively service their clients, crypto trading firms demand ultra-low-latency and always-on connectivity," he says. "With low latency comes high frequency, so infrastructure also needs to be scalable—and as volumes increase, capacity also becomes a major consideration. Instant failover, operations technology, bank-grade security, a unified FIX API, and liquidity are also essential must-haves."

Network providers like BSO and BT have already received interest from a number of DCEs, executives at both firms say. Both offer cloud and hosted services and co-locate in datacenters so clients enjoy low-latency connectivity to exchanges such as Nasdaq and the New York Stock Exchange.

Gaspard Coudurier, product manager at BSO, says crypto exchanges and crypto traders have reached out to talk about enhancing connectivity for institutional investors.

"Institutional investors, when it comes to choosing an exchange, use connectivity and latency as a parameter," Coudurier says. "We've seen a lot of institutional investors thinking of moving into cryptos so we've seen a lot of consideration for latency."

Yousaf Hafeez, BT Radianz's head of business development, agrees, saying "good quality networks will help to overcome some of the challenges of liquidity fragmentation of cryptos, and consolidated market data feeds for cryptos," and institutional investors will only be more interested once clearing and custodial services become more available.

Gaspard Coudurier
BSO

Peeking into the Order Book

Other issues facing institutional investors in the crypto space are the lack of transparent execution information, including granular market data, and an inability to take a closer look at the order book. This market information lets traders find the depth in the market that provides a better picture of different trades—and enables analytics such as pre- and post-trade transaction-cost analysis, an increasingly important benchmark in the era of tightened best-execution rules.

Traditional exchanges offer three levels of market data where traders can see price quotes. The highest level, level three, provides the investor with the best bid and asks prices, supply and demand on the price levels, price ranges, and even the ability to enter bid and ask quotes. This requires access by the exchange to its own infrastructure.

"Some large crypto exchanges have their servers actually hosted on Amazon Web Services (AWS) so there's no infrastructure like co-location or fiber networks. Not only that, the major concerns for institutional investors are to have execution feeds, on the level of market data that they can see," says Altonomy's Li. "[Most crypto exchanges] do not provide incremental changes of the order book, only a snapshot of it and you cannot always reconstruct the order book yourself."

He says these crypto exchanges have to depend on their providers' infrastructure to provide level three electronic data. He points out, however, that larger DCEs, includ-

ing Coinbase, have begun offering similar services in a bid to appeal to more institutional traders. AWS did not respond to requests for comment.

Bringing more institutional investors to the crypto space could bring more liquidity and make the market more stable. Perhaps inevitably, there are crypto exchanges that have figured out institutional investors could be the perfect target market, so they begin life as an exchange catering specifically to them.

While these exchanges are less well-known than the bigger exchanges like Coinbase, Gemini, and Bitfinex, they offer latency and execution guarantees.

One of these newer crypto exchanges looking to cash in on the entrance of institutional investors to the space is Archax, which announced the launch of its exchange in June.

"We looked around and saw exchanges that are not engineered to meet the needs of institutional investors," says Archax CTO Andrew Flatt. "This is a maturing space so we felt it was important to offer something to institutional investors."

Flatt says Archax decided to co-locate in a datacenter as it offers direct access without bouncing around on different servers, and wanted to provide a fixed connection either directly or through an API.

Archax also partnered with trading technology firm Aquis to set up a suite of exchange operations tools including a matching engine, market surveillance platform, and post-trade services.

Scott Freeman
JST Systems

Since the trading of spot cryptocurrencies is not formally regulated, Flatt says attracting regulated entities like banks had to be approached differently.

"It's a brand new asset class; of course they want to play in it," he says. "But it's honestly hard to convince a regulated entity to participate in the market without having all features on market surveillance or connectivity that a regulated exchange might have."

Other Concerns

But it is not the larger crypto exchanges or the institutional investor-focused newcomers that are problematic for institutional investors; it's smaller crypto exchanges that were set up using white-labeled software and which connect to cloud providers. These exchanges don't have the necessary infrastructure but still want to attract a larger customer base. The cloud offers a faster set-up time so a new crypto exchange can start providing trading services in popular pairs, such as bitcoin-dollar and ether-dollar, relatively quickly. Crypto exchanges turn to cloud providers' managed services features since it is often expensive to build their own infrastructures.

That is not to say, however, that crypto exchanges set up on AWS or Azure are not at all reliable. Craig Borysowich, digital platform strategist at consultancy Capco, says many believe cloud providers are more reliable than homegrown infrastructure.

"Lots of 'traditional' exchanges are also on public clouds because it's just a lot quicker to build things on it," Borysowich says. "In fact, these cloud providers may even be more resilient than dedicated datacenters and can come back faster after downtime."

He adds that latency and transparent execution may be issues for institutional investors but there are far bigger issues in the space that need to be resolved, especially with concerns around custody, continued market volatility and of course the regulatory limbo of crypto exchange-traded funds and other crypto assets.

Borysowich also notes crypto exchanges themselves have built credibility that overshadows any wariness around infrastructure particularly when the firms show they are secure and fair. But any potential market participant needs to understand the crypto world is different and cannot be made to imitate the world of more traditional assets.

Institutional investors' concerns have encouraged other firms to set up trading platforms or broker-dealer-like services that institutional investors can use with some degree of familiarity.

JST's Freeman thinks more broker-dealers will crop up as intermediaries in the market since institutional investors prefer not to have direct access to exchanges and that some crypto exchange will evolve to catering specifically to either institutional firms or retail traders.

Whatever route crypto exchanges take, institutional investors are flocking to cryptocurrencies to see what the hype is all about. But getting them to stay and enrich the market may be a different matter altogether.

"I have no doubt the market will mature and scale and institutional investors will want to get in, but before that happens, all this infrastructure has to be ready," Altonomy's Li says. "So we have to emphasize that institutional investors are so important, because the market is moving so fast that a lot of the important aspects of a traditional financial market are, by a large margin, ignored." W

SALIENT POINTS

- Institutional investors are concerned about the lack of guaranteed latency in a volatile market, and limited access to the order book can make it difficult to trade on some exchanges.
- Crypto exchanges have begun to see how important these issues are and have started to set up the necessary infrastructure to lure institutional investors.
- Exchanges may eventually bifurcate, with some only catering to institutional investors and others to retail traders.

Anthony Malakian

The End of Privacy

As cybersecurity issues become more daunting, and as vendors collect more of our personal information, Anthony says we will need Congress to take more of an active role in protecting citizens' information, even as they willingly give it away.

For the 25th Anniversary issue of *Waters*, we polled about three-dozen senior executives and asked them what the most important technology of the near-future would be. It was an incredibly interesting exercise due to the wide array of responses: artificial intelligence (AI), quantum computing, the Internet of Things (IoT), blockchain and augmented/virtual reality, were all mentioned.

I have absolutely no problem with those responses and others, but I was surprised that there wasn't more chatter around cybersecurity. I could be missing some responses—I didn't see every one as we only had so much space in the magazine—but I think that only Thomas Zeeb, head of securities and exchanges at SIX, focused on cyber.

Much like how dopers will always be ahead of those trying to keep performance-enhancing drugs out of sports, people and institutions will always be playing a game of catch-up, as there are just too many entry points for hackers to exploit.

Quite frankly, those previously mentioned technologies will help to exacerbate the cyber problem. Quantum computing will change encryption forever. IoT devices will create exponentially more entry points while putting potential listening devices in every room of every house and office. AI will help hackers to be more efficient and targeted in their attacks. While difficult, blockchains are not as impervious to hacks as some will have you believe.

Is it time for tighter privacy controls?
For more information and readers' feedback please join the discussion at **waterstechnology.com**

Perhaps people stayed away from cybersecurity because they know it's such an uphill battle and is one of defense, rather than using technology to improve the firm.

Unseen Watchers

For this issue of *Waters*, my colleague Josephine Gallagher examined how the use of biometrics and identification technologies are increasingly being used at capital markets firms after finding great success at retail banks. (*See page 10.*) It's a fascinating look at these nascent technologies and offers a glimpse into the future of security. It's also a bit unsettling. At one point she writes about a company called BioCatch and how it provides software that tracks identifying traits, such as how people normally type, how they normally use a mouse, how they input data or communicate with third parties. It's intriguing, but it's also weird to think that a software program can learn my ticks and traits, which, for me, are basically unknown or unacknowledged.

> It's also weird to think that a software program can learn my ticks and traits, which, for me, are basically unknown or unacknowledged.

I've banged on about this previously in this space, but I find it insane that people submit their DNA to sites like 23andMe.com or Ancestry.com. As we've learned with the Facebook-Cambridge Analytica debacle, we often don't know how our personal information—which we willingly sign away by signing up to social media or shopping sites—is being used by those institutions.

I voluntarily use biometrics to access my phone and financial accounts. But I've increasingly been concerned about how my fingerprint information is being stored and who can see it. Iris scanning and facial recognition technology is creepy. Who can see this information? Can it be sold to other third parties? Government agencies? How secure is it? Do these firms have top-of-the-line cybersecurity defenses? Or is cyber something that they pay lip service to?

We willingly allow listening devices into our homes. We willingly hand over our DNA and fingerprints to entities we don't really know. Where does this end?

The Lesser of Two Evils

I am not normally one for government intervention, as I fall more in the deregulation section of the Venn diagram. With that said, I do feel that Congress—or, if you prefer, Parliament—needs to start seriously addressing how these companies are using and selling citizens' data and how strong their cyber defenses are. I know that it's tough in today's chaotic political environment to think about something that isn't immediately important, but it also doesn't matter where you are on the political spectrum—this concerns you very much whether or not you think Trump is making America great again or if you think he's the Antichrist. W

It Takes a Village to Raise a Machine

As the industry—and society, as a whole—embraces the promise of artificial intelligence, James argues that there is a need to train models on more than just mathematical data.

Should we parent machines?
For more information and readers' feedback please join the discussion at **waterstechnology.com**

Most forms of artificial intelligence (AI) are hardly worth the name. Robotic process automation, for instance, which generally gets lumped in with AI as a whole, is anything but—it's a series of parameterized tasks repeated at speed and with clinical accuracy by a machine. If this, then that, for the most part. Even much of the algorithmic codebase that makes up so-called machine learning projects is barely intelligent, in the sense that humanity has hardly created programs that can think for themselves and fundamentally reinvent their purpose, as a direct result of their own self-generated impetus. That's probably a good thing.

The fact is that humans, as a whole, aren't exactly superb custodians, even to the basic forms of AI we've already created. It took Microsoft's chatbot, Tay, less than 24 hours to begin full-throated support for Adolf Hitler when it was debuted on Twitter in 2016, which is hardly surprising given the morally bankrupt morass of data out there. Indeed, some of the content posted by users on social media is so vile, so damaging, that one former content moderator at Facebook is suing the company for failing to provide adequate mental health care, resulting in them reportedly developing post-traumatic stress disorder.

But while Tay and others like it are extreme examples, bias and prejudice manifests in other ways, sometimes unconsciously in the design of technology. On page 10, for instance, my colleague Josephine Gallagher explores how biometric technology has advanced, but one of her interviewees notes that this technology sometimes doesn't work with darker skin types than Caucasian. Likewise, there are a number of examples of algorithms discriminating against, for instance, people of color when it comes to mortgages or insurance due to socio-political issues such as imprisonment rates or economic circumstances.

> Machines will need the same level of attention, care, and critically, education as we give our children.

In May, our US reporter, Emilia David, wrote about how social-science classes are being encouraged among the AI developer community, to help ground the people who create these technologies with a moral foundation of sorts. That probably doesn't go far enough—the machines, once we create appropriately intelligent ones, will need the same level of attention, care, and critically, education as we give our children.

Think about the lessons that you learn, either as a kid, or ones that you teach your kids. What defines right and wrong is one of the very first lessons that we are taught—don't do this, well done for doing that, etc. As children get older, and their cognitive abilities become more advanced, we begin to introduce the reasons behind why something is right or wrong, and more esoteric variations on that—why you shouldn't hit your classmates, why stealing is wrong, why you treat your teachers with respect.

All of this provides the child with arguably one of the most important skills in life—the ability to take in information, cross-reference it against a base of knowledge and ingrained moral positions that have been taught and reinforced over years, and then to apply that knowledge to the current situation independently, without supervision. While all of us have likely done things we are not particularly proud of in life, the fact that we are not proud of them, in itself, shows that we at least understand situational morality—and I imagine, for most of us, at least, those instances of acting against character are few and far between relative to those where we did.

If we want true AI, true thinking machines, then it's imperative that we also design education along with the technology itself, and at the very least consider the appropriate ways in which we can train models to not just make the correct decisions, but the right ones, as well. Given how AI is likely to touch almost every aspect of our existence in the future, our lives may very literally depend on it. W

Human Capital

CJC Taps Love, Moreton

IT managed services and product provider CJC has promoted senior technical director Steve Moreton to global head of product management, and has hired Karen Love as a business development specialist.

Moreton's primary focus will be MosaicOA, a real-time infrastructure data processor. He has spent 14 years at CJC in various consultancy and internal roles, following a four-year stint at Thomson Reuters as an installs engineer and specialist project manager.

His consultancy roles include market data IT consultant at JPMorgan and UniCredit, market data support specialist at Commonwealth Bank of Australia, and RMDS market data consultant at Thomson Reuters. His internal CJC roles include director of operations for Asia and senior technical director of global accounts and product management.

Steve Moreton

As the firm's new business development specialist, Love will be responsible for client outreach and finding new areas for CJC software solutions. She has spent her career in a range of front-to-back-office positions, most recently as account director at Fixnetix, a technology provider of market data, low-latency trading, connectivity and hosting solutions.

Her previous experience includes roles as director of sales and account management at trading technology and infrastructure provider Ullink, sales director at NYSE Euronext, global account director, sales director of global connectivity, and manager of broker relations at Fidessa, and vice president of emerging markets operations at Citigroup.

Love and Moreton will report to CJC CEO Paul Gow.

Karen Love

Delphix Adds Former FirstRain CEO Herscher to Board

Cloud-based data management platform vendor Delphix has appointed fintech executive Penny Herscher to its board of directors, to help take the company to its next phase of growth. Herscher, who holds a variety of board roles at technology companies, was president and CEO of artificial intelligence and business analytics platform vendor FirstRain from 2005 to 2015, and served as chairman until its 2017 sale to Ignite Technologies.

Before that, she was president and CEO of semiconductor design company Simplex, which she sold to Cadence Design Systems, where she then served as general manager and chief marketing officer. Previously, she was general manager and vice president of marketing at Synopsys, worked in research and development (R&D) at Daisy Systems, and began her career as an R&D engineer at Texas Instruments.

Penny Herscher

Anova Taps Net Vet Hilt for Sales, Marketing

Chicago-based wireless data network provider Anova Technologies has hired network industry veteran Joe Hilt as vice president of sales and marketing, responsible for supporting a global expansion into Europe and Asia and for rolling out new products for financial services clients.

Hilt was previously vice president of sales for financial markets at GTT Communications, which he joined via the network provider's acquisition of long-haul undersea cable network operator Hibernia Networks, where he held a similar role and also served as vice president of sales for the Americas, having originally joined Hibernia Metro as vice president of sales and marketing in 2006. Before that, he was director of sales and marketing at KeySpan Communications, was director of wholesale business at WorldLink, and held account manager roles at IXnet and Worldcom. Based in New York, Hilt reports to Anova CEO Michael Persico.

SEC CIO Dyson Leaves, Moves to NY Fed


Pamela Dyson

Pamela Dyson, CIO of the Securities and Exchange Commission (SEC) is set to leave her post to take up a role with the Federal Reserve Bank of New York. Dyson will move to the New York Federal Reserve as its CIO, executive vice president and head of its technology group. Current CTO Charles Riddle will be acting CIO at the SEC.

Dyson joined the SEC in 2010 as assistant director for enterprise operations where she managed the Commission's IT infrastructure and enterprise operations. Prior to joining the SEC, she was the deputy CIO at the US International Trade Commission. Dyson helped established the SEC's cloud capabilities and its governance on the cloud, she led its digital transformation efforts, and developed its ongoing cyber uplift program.

Broadridge Taps Gokey to Succeed Daly as CEO in 2019

Broadridge Financial Solutions has announced that Tim Gokey, currently the firm's president and COO, will take on the mantle of CEO, effective January 2 when Rich Daly, Broadridge's current CEO, becomes executive chairman of its board.

Gokey joined Broadridge in 2010 and was named COO in 2012. He became president in August 2017. Prior to joining the company, he was president of the retail tax business at H&R Block. He also held positions at McKinsey and Company, including leading its financial services sales and marketing practice for North America.

The company noted in a statement that Gokey was responsible for its expansion through investments and acquisitions. Daly, CEO since 2007, will take the reins of the board from Les Brun, who will transition to lead independent director.

AlphaPoint Taps Held for CFO Role

Distributed-ledger technology vendor AlphaPoint has appointed former TradingScreen and Liquidnet veteran Kevin Held as its CFO. Held has been in the industry for 30 years. Prior to AlphaPoint, he was the CFO of TradingScreen where he oversaw operations in the finance, human resources, and administrative groups. He also had positions with Liquidnet and Sandler O'Neill and Partners.

The company says Held's experience in the capital markets and financial technology sector is an asset in the firm's ambitions to further expand its customer and geographic footprint.

AlphaPoint bolstered its executive roster in November last year with the appointment of Salil Donde as CEO, replacing founder Joe Ventura, who stepped back to the role of CTO.

ISN Beefs Up Team with Ex-Bloomberg, Thomson Reuters Data Vet Hires

San Francisco-based management and data consultancy International Solutions Network has hired a raft of seasoned executives to support the company's expansion and planned new product developments. The firm has hired former Bloomberg execs Bruce Manson and Eugene Sorenson as managing directors, former Thomson Reuters exec Damien Frennet as director, and marketing veteran Juli Morris as director of marketing.

ISN managing partner Richard Clements says the company is "beefing up" ahead of an upcoming release of a new version of its VendorScape data optimization and vendor rationalization tool.

Manson previously spent 12 years at Bloomberg, including roles as business manager for transaction-cost analysis, global head of enterprise solutions for Institutional Pricing Services, global head of BVAL, and global head of fixed-income and electronic rates trading. Before joining Bloomberg, he held senior positions at SHBC Securities, Barclays Capital and Credit Suisse First Boston.

Sorensen, since leaving Bloomberg earlier this year—where he spent 12 years in roles responsible for the vendor's Graphics and Monitors suite, geospatial analysis, and its Launchpad 2010 initiative—founded Product Vision Consulting, a fintech and data product development and strategy advisory firm. Before joining Bloomberg in 2006, he was vice president of product development at interdealer broker Cantor Fitzgerald, and director of product marketing at analytics and trading technology provider CQG.

Frennet was previously chief revenue officer at Ancoa Software, which was acquired by Scandinavian financial technology vendor Cinnober last year, prior to which he spent more than 11 years at Thomson Reuters, joining the vendor as a financial application specialist before becoming


Bruce Manson

an account manager, product manager for sell-side research, global partner program manager, head of strategic business development and alliances, head of strategy, and finally head of business development for its financial business.

Finally, Morris joins ISN from credit and distressed debt ECN DealVector, where she was vice president of marketing, having held a similar role at on-demand staffing platform provider Wonolo, and director of marketing at Wanted Technologies (now part of Gartner Group), and RCM Technologies.

Manson, Sorenson and Frennet all report to Kelsey, while Morris reports to Clements.

LiquidityEdge Names Andy Bria COO

US Treasurys trading venue LiquidityEdge has appointed Andy Bria as its new COO based in New York. Bria will be responsible for further growth and leading the company's expansion plans.

Prior to joining LiquidityEdge, Bria served as head of client operations, EBS, for NEX Group, where he helped managed client-facing projects with the BrokerTec platform. He had been with NEX for over 13 years working for both the EBS and BrokerTec products.

The company says Bria's experience in electronic trading and client relations will help him to lead the trading venue's strategy and operations.

LiquidityEdge—launched in 2015—provides an alternative venue to trade US Treasurys. It began offering off-the-run Treasurys in November last year with Barclays and Credit Suisse as liquidity providers.

David Puth Steps Down as CEO of CLS

David Puth, CEO of CLS, is stepping down from the helm of the provider of settlement services to the global FX market, after leading the firm since 2012. Puth's resignation became official on September 30; chairman Kenneth Harvey was installed as the firm's interim CEO, with Puth remaining on hand through November to ensure a smooth transition.

Puth led CLS through a number of transitions, including its designation as a systemically important financial market utility, the release of several new products and services for the global FX market, a rebranding, and investments in its technology infrastructure.

CLS has hired an executive search firm and is evaluating candidates for the CEO role. While Harvey is acting as interim CEO, the company's independent director Bryan Osmar and director Rick Sears will lead the board of CLS Group Holdings and CLS Bank International.


Giles Nelson


David Puth

MarkLogic Names Apama Co-founder Nelson Finance CTO

San Carlos, Calif.-based NoSQL database and integration technology provider MarkLogic has appointed former Software AG and Progress Software technology executive Giles Nelson as CTO for its financial services business, based in London. Nelson's new role combines technology evangelism and product strategy, representing the vendor among financial firms, and representing the needs of financial services and capital markets firms within the company.

"Financial services is a big vertical for us—six of the top eight US banks are clients—so my role is to ensure we have the right go-to-market strategy in this space, and that we're paying attention to things like new regulations, and that we understand how MarkLogic can address those issues," Nelson says. "Firms may have built up siloed databases over 30 years or so, so what you really need to do is bring them together. But with so much unstructured information across all sorts of documents, you have to treat data differently—and that's what MarkLogic does. It enables organizations to leverage that data and get more value from it, quicker."

Nelson was previously senior vice president of product strategy and marketing at Software AG, responsible for its financial analytics products including the Apama complex event processing technology and Terracotta. He joined Software AG via its 2013 acquisition of Apama from Progress Software, where he served as vice president of products and CTO for EMEA, following the vendor's 2005 purchase of Apama, which he co-founded in 2000. W

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People are important to us

Since 2000, our business has been steadily growing. Our approach to technology has succeeded because we understand the financial industry. We always listen to it. Listening is part of our DNA.

Technology is the life force of our business. But we also know that while AI and robots are pretty exciting – well, we find them pretty exciting – human beings are even more important. When it comes to understanding the challenges financial institutions face, and to deciding how technology can best serve those organisations, we realise that people are paramount.

We want to know where you need to get to and how we can help you get there. That is why talking to you face-to-face is important to us, and why getting to know you at Sibos is our top priority.

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