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Women in Technology & Data Awards

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Welcome to the New WatersTechnology

For 25 years, *Waters* has stood at the intersection of financial technology and data, directing readers to the correct highway of information that they need to do their jobs. Today, with the new-look *WatersTechnology*—incorporating the former *Inside Data Management* magazine—we're doing that and more, combining our trading technology and data insights in one place to bring you what we hope you'll view as the "fintech bible."

Ever since the emergence of electronic markets, technology—from traders' execution systems and now algorithmic trading applications through risk management to back-office clearing and settlement functions—has had a symbiotic relationship with the data that powers it: One cannot exist without the other, and this new magazine reflects that.

Fittingly, several of the articles in this first combined issue address the over-arching theme of the last decade, which continues to exercise an enormous influence on financial firms' technology and data strategies and spend: regulation.

A perfect example of the impact of regulation on data and technology is the Securities and Exchange Commission's new N-PORT form for funds reporting. Though the form does not necessarily ask for new data points, it does require more data, and for that data to be reported more frequently than in the past. To achieve this, financial firms must locate and pull together datasets that previously didn't need to communicate, and have needed to employ automated data capture mechanisms to eliminate manual processes that would not have been efficient under the new requirements.

With regulatory compliance—and its impact on technology—a costly burden, it's no surprise that the profile this month is a lawyer: Nausicaa Delfas, head of international at UK regulator the Financial Conduct Authority (FCA), who is tasked with heading its policy on Brexit and implementing a technology roadmap that will give the FCA confidence in its ability to fulfill its regulatory obligations outside the auspices of the European Union.

US regulator the Commodity Futures Trading Commission is also feeling confident about its ability to meet the challenges ahead—the result of a budget increase to $281 million for this year, $86.5 million of which is for the agency's Office of Data and Technology. CFTC chair J. Christopher Giancarlo, who is expected to step down this year, says the budget will allow the agency to become the quantitative, big data-focused regulator that it needs to be, to oversee firms with far greater resources in this area than its own.

Whether you're a regulator, bank, asset manager, exchange, vendor or any other participant in today's complex capital markets ecosystem, as you stand at this intersection of technology, data and regulation, searching for the correct route forward, *WatersTechnology* stands beside you as a trusted partner to help navigate these uncertain highways, and we look forward to accompanying you on your fintech journey. wt

Max Bowie
Managing Editor

waterstechnology

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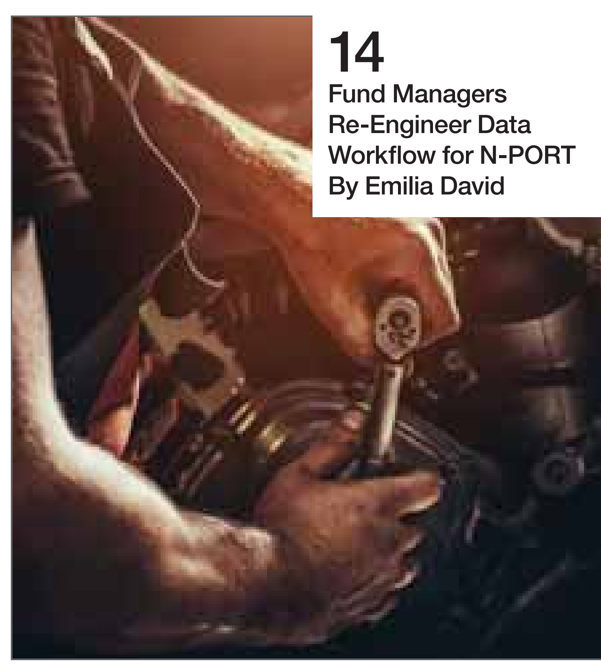

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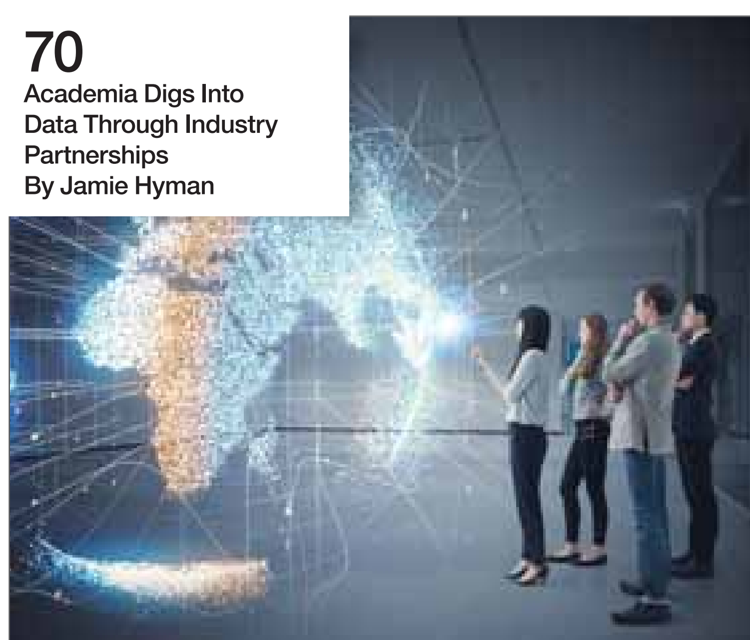


CFTC Chair Says Agency is 'Finally' Getting Resources to Bolster Tech

Giancarlo lauds budget approval from Congress in swansong industry appearance. By James Rundle

According to the outgoing head of the US derivatives regulator, the Commodity Futures Trading Commission (CFTC) is heading in the right direction with its efforts to modernize its technology, citing congressional approval of an enhanced budget, but it still has some distance to travel before it truly becomes a "quantitative regulator."

J. Christopher Giancarlo, chair of the CFTC, told reporters at a futures industry conference in Boca Raton, Fla., on March 13 that he felt the agency had made great strides towards his stated goal of turning itself into a "twenty-first century regulator."

"We're definitely in the direction we need to go," Giancarlo said, in response to a question from *WatersTechnology*. "We've recruited some great people, like [CFTC Labs head] Daniel Gorfine, and our new chief market intelligence officer, and others. We've set the tone in the agency, and we're finally getting some of the resources that we need to deploy to do that."

Those resources have come in the form of an increased budget for the CFTC—the first such increase in more than five years—which Giancarlo said has been approved by Congress. The budget includes $86.5 million for the Office of Data and Technology, an

> "The last time the CFTC got a bump up, it was based upon some other elements of Dodd-Frank being taken out. This time, it was based upon our funding request, and we will put those resources to good use, both technologically and in terms of personnel"
> **J. Christopher Giancarlo, Commodity Futures Trading Commission**

$11 million increase on the previous year, accounting for nearly one-third of the $281 million total budget for 2019.

"The last time the CFTC got a bump up, it was based upon some other elements of Dodd-Frank being taken out. It was a deal," Giancarlo said. "This time, it was based upon our funding request, and we will put those resources to good use, both technologically and in terms of personnel."

Giancarlo is likely to step down from the agency in the summer, subject to the confirmation of Heath Tarbert, a Treasury Department official, as the new CFTC chair. Tarbert's nomination debate in the Senate Agriculture Committee was ongoing at the same time as Giancarlo's press conference.

Leveraging Data, Tech

A former executive at interdealer broker GFI, Giancarlo has long been an advocate of expanding the CFTC's modernization program, at a time when other agencies, including the Securities and Exchange Commission (SEC), are dramatically increasing and changing their use of data and technology.

Even so, the CFTC's budget is dwarfed by that of its sibling regulator. The SEC's budget request—approved in February 2019—reached $1.658 billion. Part of the justification for this rested on the agency's need to "leverage technology and data to extend the agency's capabilities, improve its cyber risk profile, and further enable the SEC to manage the massive amounts of data submitted" to its systems.

The SEC, largely by dint of its role in regulating far larger and faster-paced markets than the CFTC, has also long been aware of its need to embrace technology. It currently subcontracts the Market Information Data Analytics System to Thesys Technologies, and although it is not running a similar software platform for trade data, a project known as the Consolidated Audit Trail, it will benefit directly from it. In addition, the agency employs a number of data scientists throughout its various arms, including its economics and enforcement divisions.

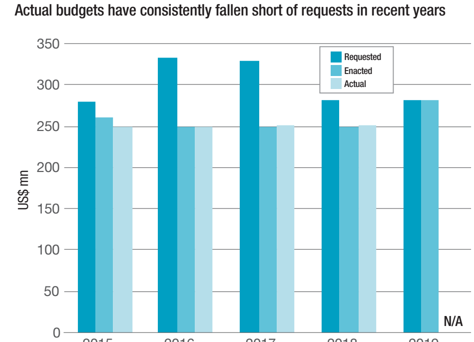
> "I've been very clear... on the need to become a quantitative regulator. I talked about the big-data capability that we aspire to. We have some of that, but we don't have all of it, and money is a big, important item [for achieving that goal]"
> **J. Christopher Giancarlo, Commodity Futures Trading Commission**

Budget Constraints

Yet even with its larger arsenal of tech, the SEC is also a victim of constrained resources. Part of the justification for its raise in expenditure, it said, was to modernize technology, the budget for which had fallen from $100 million in 2015 to $50 million last year. It had also instituted a hiring freeze at the start of the 2017 fiscal year, and it said in its request that it was necessary to restore 100 positions—around a quarter of those lost—in critical priority areas.

CFTC Budgets: Hope versus Reality

Actual budgets have consistently fallen short of requests in recent years



Source: Commodity Futures Trading Commission

Doing more with less has become something of an uncomfortable factor for many regulators internationally, mirroring the experiences of the CFTC and SEC. Indeed, the European Securities and Markets Authority (Esma) has long been an ardent critic of the resources it is assigned—generally around $45–50 million per year—in light of the technological work it needs to undertake in order to effectively regulate the markets it oversees, and has had to resort to fairly drastic measures in the past to protect areas of its budget it sees as critical.

The move by Congress to approve both the CFTC and SEC budgets is, however, certainly a turnaround for the agencies, which have typically had to fight tooth and nail for even modest increases. Yet there is a growing acceptance that enforcement is falling behind the capabilities of watchdogs. During a speech delivered at Georgetown University Law School in November 2018, Giancarlo spoke of the need for the CFTC to become a "truly quantitative regulator," through its use and analysis of data. The agency has started down that path, he told reporters, but it is a continuing journey.

"I won't disclose to the public what capabilities we have and what we don't, as I don't want people that have bad intentions to try to take advantage of what we're able to do and what we're not. But I want to do more," he said. "I've been very clear in the speech that I gave last fall at Georgetown Law School on the need to become a quantitative regulator. I talked about the big-data capability that we aspire to. We have some of that, but we don't have all of it, and money is a big, important item [in achieving that goal]." wt

Data Becomes Essential to Price Research

The collection of data on research usage required by Mifid II is providing greater visibility into research practices on the buy side, while helping the sell side to accurately price its research, reports Amelia Axelsen

Mifid II, which became European law in 2018, introduced unbundling rules to separate the cost of research and execution. To navigate the tricky rules on research unbundling, sell-side and buy-side firms, as well as research providers, must collect data on how and where firms consume research.

The rules are a contentious topic for regulators and investment firms. Unbundling puts pressure on firms' research practices, and requires better management of the research they ingest. This has fundamentally altered how firms evaluate research providers and the budgets appropriated for these resources, while also forcing research providers to overhaul how they serve clients with smaller budgets and selective preferences. The regulation has produced mixed results, with all players collecting much-needed data to readjust their practices.

Rebecca Healey, European market structure specialist at Liquidnet, says research unbundling on the buy side has forced asset managers to undertake a long-overdue evaluation of research practices, which has produced a better understanding of where firms are spending money.

"Independent of their location, asset managers need to provide greater transparency to end-investors on total costs and charges in both the execution and research processes," she says. "This trend goes well beyond the scope of Mifid II, whether you are looking at RG 97 in Australia or the improved investor protection regime in the US. All asset managers now need to demonstrate the value they are delivering to clients wherever they sit on the globe."

She says research unbundling also helps asset managers—now aware of what they are being charged by providers—to deliver value to end-investors, which is required by new regulations. Gathering data and quantitative evidence that provides proof of the resources being used can have a positive impact on fund performance, she adds.

UK-based Schroders Investment Management has implemented a solution to gather interaction data from its research providers. Speaking at the International Capital Market Association's Asset Management and Investors Council conference in November 2018, Angus Bogle, co-head of equities management at Schroders, said this data allows the firm to refine its evaluation process and get more detail on where it allocates research funds. The transaction data also revealed trends and informed the business how much it was actually consuming.

Bogle said he expects research providers to compromise on quality and service to offer cheaper prices. According to a Schroders survey of data quality following the implementation of the unbundling rules, he said, "the general impression" was that quality of research from big banks and brokers had declined, though less than research from small retail providers, while research quality from independent providers stayed the same.

Although the firm has a better grasp of what research is being used and from what provider, one of the biggest challenges is consolidating the providers into a single vendor platform, which is not likely to happen, Bogle said, because fund managers at the firm are reluctant to change providers and platforms. Even if Schroders forced the entire fund to switch to one platform, "there were none that had the depth and breadth we needed in terms of research providers to give access through that," he said.

Rebecca Healey
Liquidnet

Liquidnet's Healey says research providers—sell-side firms in particular—are having to reassess and realign their business models to adequately service clients.

"The sell side was flooding the buy side with research, so there was no way to actually know what was entering and who was receiving what research," she says, whereas now that the buy side must indicate what it wants, the sell side has had to change its distribution model—it can no longer inundate asset managers' inboxes with research.

And providers might not know how much the buy side is willing to pay for research, because cost was not a factor until now, leaving them to work out their compensation models and readjust price points to determine whether firms are paying the right amount.

> "Asset managers need to provide greater transparency to end-investors on total costs and charges in both execution and research
> **Rebecca Healey, Liquidnet**

This depends on the different types of research. For example, she says, fixed-income research, which is macro in nature, will be used by all qualified firms, so providers may offer it for free. But to do that, they must offer it to all clients for free. Some sell-side firms are opting to charge minimal fees so they can measure how many clients want it. Similar to the buy side collecting data on how it uses research, sell-side firms also need to collect data on what it costs to service an array of clients, from tier-two banks to global asset managers, in order to set better prices. wt

Hermes Ramps Up Cloud DevOps Strategy

After years of patching holes in its hull, one of the UK's largest fund managers has dramatically increased its ability to push new code, thanks to its use of Microsoft's Azure cloud, engineers tell Josephine Gallagher

London-based Hermes Investment Management has built its development and testing environments from scratch on Microsoft's Azure cloud infrastructure, accelerating its ability to release new technologies into production, and to roll out multiple new releases per day.

Only a couple of years ago, Hermes' IT department—which comprises around 12% of the firm's 470 staff—was struggling with operational overhead from monitoring work environments, managing as many as 220 servers, fixing bugs and patching up systems, said Darren Hodges, head of development at Hermes, during a presentation at The Summit for Asset Management, held on February 28 in London. At that time, the firm was outsourcing development to a team in India, whose primary focus was to stabilize the core functions and keep the business ticking over.

"They were fighting fires; they weren't really thinking about the strategic direction," he said.

Between 2016 and 2017, Hermes shifted its approach, and set its sights on growing the business and revamping its approach to technology development. It dismissed the outsourced developers and built a London-based, in-house development team.

"We need them to have a range of skills, and to be willing to actually roll up their sleeves and get stuff done. This is also part of our interview process in trying to find those broad-minded people that can get stuck into anything that needs to happen," Hodges said.

Today, Hermes has reallocated 50% of its IT team to focus on strategic direction, and roughly 25% to support the business. As part of the new approach, development teams are also set 10-week sprints as opposed to shorter two-week cycles. The objective is to provide the developers with an effective roadmap to enable them to think ahead, focus on more important problems that require more time, and deliver tangible results.

Hermes' native cloud environments offer scalability

Hermes has also reworked its development lifecycle by automating testing and implementing tests at earlier stages of the process. As each developer creates code, it triggers a build that is automatically deployed and tested in the cloud environment. This removes the need for a dedicated testing team, where every developer is made responsible for ensuring the code is viable and works.

Speaking during the presentation, Sejai Modi, a DevOps automation test developer at Hermes, said the flexible cloud environment and this strategic approach to development allows the firm to work on releases overnight. Through the day, developers write the code, it is tested, a build is done, and at 4am UK time a release is quoted. The code is then deployed in the cloud test environment, an end-to-end progression suite is run, and results are published back.

"This means that when our development teams come in first thing in the morning, they are able to see the results of the [release and the] fix that was made, and they can then move on to the next task that they were working on," Modi said.

Contrary to many investment firms that have migrated operations to the cloud, Hermes decided to take a different approach and build native cloud environments for development and testing. The infrastructure has provided the firm with the necessary scalability to accomplish these tasks, and allowed it to offload the cost and pressure of maintaining its proprietary servers.

"You can scale up and scale down," Hodges said. "Take your test environments: they are not used 24 hours a day, so why keep them on 24 hours a day? Why pay for an infrastructure when we are not actually using it? Similarly, today our [test] workstations are all switched off. The point is, why pay for workstations when they are not in use?"

Similarly, every night, when code has been deployed and tested, a record of the release is created. After 4am, the development and testing environment is dismantled and shut down, including the servers, networks, firewalls, security layers, and storage. The next morning everything is rebuilt from the ground up in 30 minutes. All the applications and configuration components are reinstalled, including Microsoft's SQL server, and all the data is normalized.

"We don't need to worry if a server isn't big enough or if we need more CPUs. We change a tag, we run the code, it destroys the machine, it starts it up again and—bingo!—we have got the new machine," he said.

In the coming months, Hermes is expected to complete the move of production to Azure's cloud infrastructure, as part of a wider strategy at the firm to shift its entire operations stack to the cloud. wt

DTCC's Blockchain-Powered Trade Info Warehouse Set for Late-2019 Launch

The DTCC's credit derivatives processing facility, one of the more ambitious market structure projects utilizing blockchain, will go live on the distributed ledger platform by the end of 2019, reports James Rundle

The Depository Trust & Clearing Corp.'s Trade Information Warehouse (TIW), which handles lifecycle events for the majority of trades in the $12 trillion credit derivatives market, is complete and is set to go live by the end of the year, officials say.

"We've been undergoing a period of robust testing," says Jennifer Peve, managing director of business development and fintech strategy at the DTCC. "We've been very pleased with the results so far, particularly given that this is such a nascent technology."

Jennifer Peve
Depository Trust & Clearing Corp.

The platform, which was built by IBM and Axoni, with industry distributed-ledger technology (DLT) consortium R3 acting in an advisory capacity, has been under development for some time, and its release has been continually pushed back. *WatersTechnology* reported in September 2018 that the project was scheduled for an early-to-mid-2019 launch, after it had failed to meet previously suggested go-live dates stretching back more than a year.

However, the project is not being developed in isolation. Along with industry participants testing the platform—the first proof-of-concept test was conducted in April 2016 between the DTCC, IHS Markit and four banks—there are also other firms waiting for the implementation to be complete so they can release their own technology revamps. IHS Markit, for instance, through its MarkitServ division, is planning to integrate with the TIW as part of the introduction of its next-generation TradeServ platform.

The TIW project is also one of the most high-profile examples of how DLT can be practically applied within complicated markets such as credit derivatives trading. While the technology has received an enormous amount of attention in recent years, real-world examples of working platforms are rare, and those that have worked have often been confined to targeted applications that handle reference data such as corporate actions, or proof-of-concept tests that aren't yet in production.

The DTCC has long been an ardent supporter of DLT. Peve explains that the work accomplished on the TIW not only provides a working example of the benefits of this technology, but also lays the groundwork for future iterations of DLT in other asset classes.

"With TIW, we've re-platformed, and we've created this foundational layer where we have the opportunity to have real-time data synchronized across multiple participants. Over time, if we can demonstrate that's successful, we can then start to think about how we can add additional asset classes, or lifecycle processing, to that platform. When you start to do that, you start to aggregate the data into a single node for clients, and then it becomes a conversation about if there is a future vision about reducing the technology footprint."

That vision, she says "is a good five years off," but she adds that the technology has shown promise. Outside of the TIW, the DTCC has also partnered with Digital Asset Holdings and R3 to explore the possibility of using a DLT-based system for equities settlement.

Cracking such a case would go a long way to proving the viability of using DLT in capital markets, given that the protocols widely used to date have been criticized as being too slow and incapable of handling the kinds of volumes processed by the DTCC, which on average processes more than 100 million trades daily.

The DTCC ran parallel tests with the two companies, in which it picked a point in time for US equities clearing data where it cleared 115 million trades on a particular day. It then tasked the firms with using their technology to handle the processing of 6,300 trades per second continuously for five hours. The tests were conducted in ring-fenced Amazon Web Services cloud environments into which the DTCC deployed 170 nodes, of which 25 were exchange nodes that submitted trades to the network, a DTCC node that performed netting, and then executed settlement on-chain, with the rest representing participants.

Both platforms were able to achieve the numbers for two consecutive days. Peve admits that, as it wasn't a stress test, they didn't "push the boundaries" with the test, but also says that they didn't hit the performance cap, either. What the test told them, she says, was that the system can handle high volumes—perhaps not specifically for US equities, but sufficient that other markets may benefit from it.

Peve says the key strength of DLT lies in its ability to provide real-time data in a single source, along with the security elements.

"For us, it's about providing a foundational layer where data is synchronized on a real-time basis across multiple participants. You can do that through APIs… but for the real-time aspect of this data [that's key], and the cryptographically secured data on the ledger is a selling point. It's not perfect, but there's added value in every record being cryptographically secured." wt

Crypto Markets Tap Mainstream for Surveillance

Digital currency exchanges are using established market surveillance services in a move that aligns them more closely with institutional-level infrastructure and traditional market structures. Emilia David reports

Cryptocurrency exchanges are attempting to inspire confidence among institutional investors by employing surveillance software from vendors that more commonly serve the needs of traditional capital markets firms.

The latest crypto exchange to look to more established market surveillance platforms is Goldman Sachs-backed Circle, which announced a partnership with Nice Actimize in early March. This move follows similar steps by Gemini, a crypto exchange founded by the Winklevoss brothers, which last year tapped Nasdaq's Smarts market surveillance platform to monitor trading pairs and its auction process.

These moves reflect a desire among crypto exchanges to further institutionalize their offerings in a bid to win over institutional investors that may have lingering concerns about the risks and security associated with crypto markets.

> Cryptocurrency [trading] functions are similar to foreign currencies… The difference is in execution, but from a surveillance point of view it's still an exchange
> **Cromwell Fraser, Nice Actimize**

Crypto exchanges are wooing institutional investors

Crypto exchanges and other companies involved with digital assets have increasingly sought to reassure a reticent core of institutional investors. In May last year, Coinbase announced it was setting up an electronic marketplace specifically for institutional investors, while Gemini and Bitfinex have datacenter co-location strategies to tackle latency concerns and address the "Wild West" reputation of crypto trading. By introducing formalized surveillance departments, supported by professional-grade technology, crypto marketplaces hope to demonstrate the maturation of the asset class.

Tony Sio, head of marketplace and regulator surveillance at Nasdaq, says offering market surveillance for crypto firms is a natural progression and shows that crypto is on its way to becoming an established asset class.

"Our surveillance technology began with addressing equities and then moved to developing solutions for derivatives, then commodities, fixed income, foreign exchange, and so on. Moving into the digital asset space is a natural progression," Sio says. "As a technology provider, we have learned enough from the past to be ahead of the curve on surveillance, and not need to wait for failings in the marketplace to have regulators force the need upon us."

Regulatory bodies do not yet require market surveillance for crypto assets. The Securities and Exchange Commission is expected to release a ruling around surveillance, along with other potential regulations for crypto assets, in the near future.

Cromwell Fraser, a subject matter expert in financial markets compliance at Nice Actimize, says while there will certainly be a learning curve around this new asset class, the mechanics of surveillance for cryptocurrencies are similar to other products and markets.

"The most challenging part is the nuance of the market—seeing how the data looks and how these transactions work," Fraser says. "But cryptocurrency [trading] functions are similar to foreign currencies. It is, for us, a new asset class, and like with other new products banks come up with, we have to build market data for it. The difference is in execution, but from a surveillance point of view it's still an exchange."

He says crypto operators may also be interested in using know-your-customer and anti-money laundering services from established firms.

Despite the similarities between cryptocurrencies and other markets, Sio and Fraser say there are also unique challenges. Sio says crypto assets do not behave in the same way as more traditional securities as volatility is higher, so surveillance platform providers must make minor adjustments to their products, even if the process is still largely the same.

Investors are bound by regulations requiring oversight of transactions. Market surveillance aggregates market data and determines baseline trading behavior to make it easier to detect market manipulation.

Circle's chief legal officer, Gus Coldbella, says working with Nice Actimize "sends an important message to our customers: that we are focused on delivering a high-quality and safe user experience and we're making constant improvements to arm ourselves against schemes that might harm our customers."

The focus on safety and transparency, and the ability to detect manipulative behavior "will be successful not only for Circle, but for the industry as a whole," he adds. wt

Apex Cuts Data Cost of Acquisitions

The fund administrator is halfway through a project to eliminate duplicative data spend across its legacy business and acquisitions, reducing costs while consolidating sourcing to a core base of vendor relationships. Max Bowie reports

Bermuda-based fund administrator Apex Fund Services has slashed data spend by between 30–40% through its deployment of a central data management platform and implementation of processes to monitor data usage and eliminate duplication of data sourcing.

The move was driven by an acquisition spree that has seen Apex snap up eight companies over recent years—each of which had different data providers, contract terms and sourcing strategies—and is designed to eliminate duplicative costs, as well as leave the company better placed to onboard any future acquisitions faster and easier.

"It puts us in a place where, for every acquisition we do, we won't be adopting inefficiencies… and gives us confidence at the management level that we have the right vendors, contracts, and usage, and not redundant or duplicative behavior. That enables us to be much quicker and more efficient," says Chris Mulhern, global head of operational strategy at Apex.

Mulhern joined the firm as global program manager in late 2017, following Apex's acquisitions of Equinoxe Alternative Investment Services and Deutsche Bank's fund services business, specifically to manage the integration of acquisitions, and in June 2018 took on his current role, which includes responsibility for IT, HR, and integrations.

"Acquiring different organizations has added multiple different technology systems, processes, and ways of doing things around market data, securities masters, and terms and conditions… and our strategy to manage this efficiently is to reach one golden source," he says. "The acquisitions Apex has made range in size and complexity

Using Goldensource has produced 30% savings on vendor data in areas onboarded so far

from fund administration businesses to banks… and the result is eight different existing ways of doing things, and eight sets of data and applications. When we started evaluating our integration plans, we found that each company had different types of relationships, contracts, and types of data that they were bringing into their systems."

For example, some of the companies acquired by Apex were populating their security masters with data from half a dozen sources, which meant that not only were those firms ingesting more data than needed to compile a security master, they were also paying for each instance and paying staff to reconcile those data sources against one another.

"They had the appropriate number of relationships with different vendors, but they weren't monitoring usage," Mulhern says. "Even the legacy Apex business was in a position as it grew organically where it was showing signs that we needed to consolidate applications and data, and manage them better globally…. We knew we had to start to think about consolidation of vendor market data, streamlining channels, and having more consistent pricing policies."

To achieve this, Apex enlisted data management software vendor GoldenSource to act as its central platform for managing data and usage. The firm began rolling out GoldenSource in late 2018, and so far has onboarded the legacy Apex business and three acquisitions onto the platform. It anticipates having all business lines running on GoldenSource by the end of 2019.

The GoldenSource platform allows the firm to create consistent approaches to how it captures, stores, and distributes data, and to monitor metrics around usage, and identify wastage or duplication. "It gives us a high level of control and governance, and enables us to streamline our data operations… helping ensure our people are working smart and not wasting time on processes that aren't relevant," he adds.

This has translated to a saving of more than 30% on vendor data for the areas onboarded so far, and Mulhern says he hopes that level of saving continues for those yet to join the platform.

Using GoldenSource has also enabled the firm to refine its global policy about which vendors it uses for pricing assets, and create a hierarchy of primary, secondary and tertiary providers that it uses for different instruments—typically Bloomberg, Refinitiv, and IHS Markit, depending on the asset class in question—based on quality, coverage, and cost, as well as client preference (for example, if a client has created an investment product linked to a specific benchmark or data source).

As a result, Apex has trimmed more than 15 vendor relationships that the firm and its acquisitions maintained to around seven or eight core vendors that cover the gamut of its data requirements, and terminated deals with the rest.

A Blueprint for Alternative Data in Asset Management

Suvrat Bansal, chief data officer and head of innovation at UBS Asset Management, sets out his recommendations for using alternative data in the investment process.

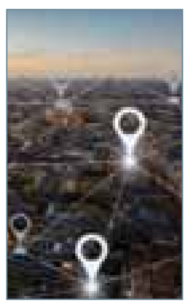
Understanding and implementing alternative data is a difficult but increasingly important task for asset management firms. If properly applied, it can provide unique insights into economies, sectors and companies beyond earnings and market data.

Traditional data is broadly defined as company-specific information or market data that is aggregated, harmonized and provisioned by data vendors or exchanges. Alternative data comes from a wide array of sources, including mobile phone activity, transactional data from credit- or debit-card sales, social media activity, GPS tracking, drone or satellite imagery, and many others.

As more asset management firms explore the use of alternative data, we suggest some best practices for developing a blueprint for implementation.

Relevance

The application of these capabilities should differ by investment strategy, such as style, sector, region, and asset class, etc. The type of data relevant to a long/short equity hedge fund manager will be different from a long-term active asset manager. Signals generated by alternative data can have a short time-frame, and can have high turnover with changing market dynamics. At UBS Asset Management, we take different approaches for active management, systematic investing and hedge funds. Systematic and quant teams typically like datasets with good history, so they can back-test the data in their quant and optimization models, whereas active management teams prefer to get data to support or reject a research hypothesis at a given point of time.



GPS tracking is just one form of alternative data

Long-term thinking

Don't rush it. Research processes and investment philosophies are the result of decades of academic research and industry experience. A recent benchmarking study, sponsored by UBS Asset Management, found that asset managers who are making measurable gains through alternative data efforts started the journey four-to-five years back.

Organization and Engagement

Developing all the scientific and engineering methods possible to utilize alternative data is not going to produce the intended results unless you use these insights to transform your research process. It is crucial to create an engagement model that mandates and incentivizes both the producer of such insights, and the research teams who actively evaluate the insights as part of their specific research efforts.

Talent

You may need skillsets not typical to traditional asset management organizations. Designing IT architectures to support high data volumes, Agile engineering to process unstructured information, and machine-learning skills to develop mathematical and statistical models to extract unique insights are some examples of requisite skills for a successful application. Given the continuous evolution in these capabilities, you will want to invest in a team that has a similar long-term focus, with the agility to produce near-term outcomes.

Data

Before buying alternative data, seriously consider to all the internal data you have at your disposal, including research documents, transactional activity, historical market data and other information. We are finding useful applications of internal data, from generating unique signals derived from research documents using natural-language processing, to predicting operational errors by analyzing operational-process metrics. In terms of external alternative data, we have experienced success with structured data, such as combining credit-card sales data with fundamental data, including earnings and revenue filings. On the unstructured data side, applications range from sentiment indicators in earnings transcripts and news, to summarizing thousands of research reports.

Platform

Leveraging such a wide variety of data and modeling capabilities will require a scalable and flexible platform that can respond to multi-factor backtesting, and be able to handle the requirements of NLP. Firms should plan early for such a platform. Beyond the technical capabilities, it will require data governance, model governance, model monitoring, personally identifiable information (PII) data considerations and the like. UBS Asset Management is deploying a hybrid cloud strategy, with the alternative data research platform to be fully cloud-enabled.

There are a wide array of alternative datasets available, but improving research and alpha through these requires a thoughtful, long-term approach. We hope our peers will find these considerations helpful in successfully harnessing emerging data, and data-science capabilities within their firms. wt

OPEN OUTCRY

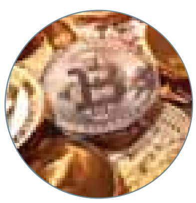
This month's roundup of what the key figures in fintech and data are saying.

"In these circumstances you would select the technology that is the most modern, the most cost-effective, and the one that can scale. Scaling up is key because with some technologies you can add markets, hundreds of new products or hundreds of new clients at the same cost base." **Anthony Attia, CEO and global head of listings, Euronext Paris**

» *see page 82 for full feature...*

"The relationship between ESG factors and performance is complicated because it varies a lot depending on the type of company, the sector, the [time] horizon, and return impacts versus risk impacts—some indicators are more about if there's poor governance that might result in better returns for some period of time, but your exposure to tail risk [increases] and your long-term prospects are dimmer. It's not straightforward and it's an area that's ripe for fact-based, data-driven research and analysis." **Will Kinlaw, head of State Street Associates**

» *see page 74 for full feature...*



"I don't think, when we talk about financial transactions, we need less trust. I think that's diametrically opposed to our viewpoint when it comes to central clearing because one of the things with managing risk is you need to understand the rules and have a degree of certainty about how events will unfold when you need to manage that risk. So decentralization may be an attractive aspect of the technology, but central clearing provides the trust to get market participants to do these things that provide liquidity, and you need certainty at the point of liquidity." **Tim McCourt, global head of equity index and alternative investment products, CME Group**

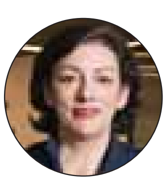
» *see page 18 for full feature...*

"The last time the CFTC got a bump up, it was based upon some other elements of Dodd-Frank being taken out—it was a deal. This time, it was based upon our funding request, and we will put those resources to good use, both technologically and in terms of personnel." **J. Christopher Giancarlo, chair, Commodity Futures Trading Commission**

» *see page 4 for full feature...*

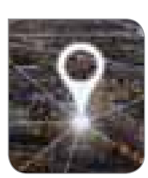
"They get access to the datasets in a controlled way; we get access to new talent and new and innovative ideas." **Gary Goldberg, CDO, Mizuho Securities EMEA**

» *see page 70 for full feature...*



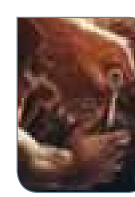
"The FCA has always been in a position where there is constant change, whether it is a change in scope or implementing other directives. So, one of the strategic approaches that we are taking at the FCA is our transfer to the cloud.... It will have other benefits such as reducing cyber and operational risks as well, and enabling us to be nimble and innovative going forward as an organization." **Nausicaa Delfas, executive director of international, Financial Conduct Authority**

» *see page 20 for full feature...*



"It is imperative to create an engagement model which mandates and incentivizes both the producer of such insights and the research teams who take active interest in evaluating the insights as part of their specific research efforts. Forming dedicated teams within the research function, who focus on insights produced through alternative data, NLP and AI capabilities, promotes ideation and application of insights into traditional research methods." **Suvrat Bansal, CDO and head of innovation, UBS Asset Management**

» *see page 11 for full feature...*



"We created a comprehensive inventory of all data elements required for the filing, identified elements available from internal sources such as our financial reporting security master database and developed feeds from clients or third parties for the remainder. The primary goal was to automate data capture and avoid manual touchpoints to provide straight-through processing. We worked with our technology vendor on systemic controls to ensure data completeness and accuracy." **Keith Slattery, global head of traditional fund accounting, JP Morgan**

» *see page 14 for full feature...*

NEWSDESK

WatersTechnology's roundup of headlines that hit the wire this month from around the industry

Cboe Gains Approval for Dutch Base

Cboe will run its existing services in the UK after Brexit

Cboe Global Markets has received regulatory approval for its Amsterdam offices from the Dutch Authority for Financial Markets (AFM), permitting it to continue servicing its EU27 clients following Brexit.

The European firm will now be authorized to operate a regulated marketplace, multilateral trading facility and an Approved Publication Arrangement. The new entities will function as Dutch-based subsidiaries under Cboe Europe BV. Cboe will continue to operate its existing exchange and services in the UK after Brexit. The firm will also establish new European Economic Area-listed symbols for the separate trading venues located in the Netherlands and UK.

The latest announcement follows a string of approvals from trading and reporting firms looking at setting up shop in the Dutch capital. January 15 kicked off the year, with Tradeweb Markets and Bloomberg receiving authorization for their EU-based offices. MarketAxess announced regulatory approval of its new legal entities on February 27.

Josephine Gallagher

CAT NMS Committee Proposes Five-Month Delay to Broker Reporting

Consolidated Audit Trail faces delays

Industry member reporting to the Consolidated Audit Trail will be delayed again, as the body charged with overseeing its development has proposed moving its testing period to December 2019.

Large broker-dealers will now work toward a go-live date of April 2020 for equities, a five-month delay from the planned November 2019 deadline, according to the National Market System (NMS) Operating Committee. Options are still set for a May 2020 deadline. Testing for both equities and options will now begin in December. Reporting for smaller broker-dealers will follow in 2021 but testing deadlines have not been finalized by the CAT NMS (National Market System) committee.

The committee has submitted a request for the extension to the Securities and Exchange Commission (SEC), which has not yet approved it. The SEC declined to comment on the extension.

Emilia David

Crypto Research Firm Chainalysis Gets $30M Funding

Crypto asset research firm Chainalysis received a $30 million investment to aid its expansion push, and develop new research around the crypto industry. The series B financing round was led by venture capital firm Accel and will be used to open a new office in London that will be primarily focused on research and development. It will also help fund the hiring of additional sales and marketing employees, particularly for Europe and Asia. Accel partner Philippe Botteri will join the Chainalysis board.

Emilia David

The deal will see Philippe Botteri join the Chainalysis board

IPC Invests in GreenKey Technologies

Communications specialist IPC Systems has taken a minority investment in artificial intelligence-focused startup GreenKey. The size of the investment was not disclosed. IPC CEO Bob Santella has joined the firm's board.

Itiviti Unifies Product Offering

Swedish vendor Itiviti has reorganized its product offering under two verticals, dubbed Trade, covering FIX engines, and Connect, encompassing trading tools. The vendor merged with Ullink in 2018.

CQG and San Juan Form Partnership

Vendor CQG and the San Juan Mercantile Exchange have formed a strategic partnership, under which clients of the digital asset exchange will gain access to CQG's suite of trading, risk and data tools.

Nasdaq to Power Bcause Exchange

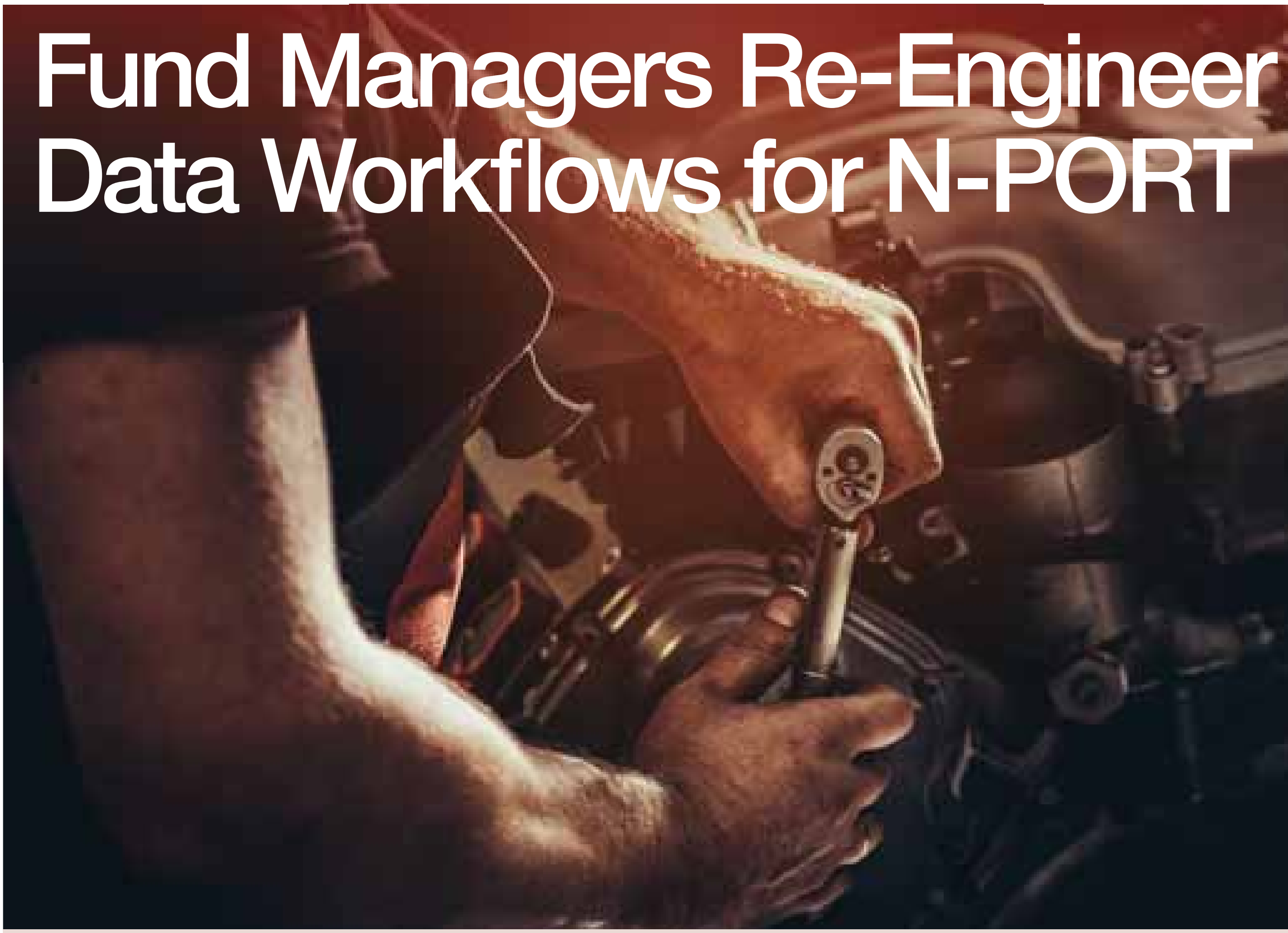
Nasdaq will supply the matching engine, clearing and market surveillance technology for the Bcause spot cryptocurrency market, which is also registering as a derivatives market and clearinghouse. Bcause is set to launch in the first half of 2019.

SmartStream Partners with Cassini on Margin Rules

SmartStream Technologies and Cassini Systems have joined forces on uncleared margin rules set to come into force in 2019. This will integrate Cassini's analytics platform with SmartStream's tech for margin calculations.

waterstechnology.com
For more information and readers' feedback please join the discussion

Fund Managers Re-Engineer Data Workflows for N-PORT



With more frequent and granular reporting for fund managers looming, firms have had to figure out how best to connect all the data needed to meet the new requirements. This has necessitated a widespread change in how data is moved throughout an organization. Emilia David reports.

As financial services firms move to diversify their investments and expand their holdings, it has become important for regulators to have a better understanding of fund managers' portfolios. Regulators are now asking for more information on a more frequent basis to better understand—and respond to—emergent sources of systemic risk.

This increased transparency is not limited to the world of equities trading; it has also extended into investment funds. Mutual funds and exchange-traded funds (ETFs) have always reported on a quarterly basis to regulators, but soon this will change, with reporting becoming not only more frequent but also more detailed.

As regulators have sought more insight into areas they oversee, investment companies—mutual funds, and even asset managers—have had to overhaul their data management and aggregation processes to comply with increasingly forensic requirements.

Reporting for these funds will be more of a challenge as new requirements from the Securities and Exchange Commission (SEC) come into force in May. Fund administrators will begin reporting to the SEC using a new form, called N-PORT, which will see investment firms push out information on all of their holdings on a monthly basis instead of the quarterly period they are used to.

Greg Smith, senior director of fund accounting and compliance at trade group The Investment Company Institute (ICI), says the new reporting standards will allow the SEC to react more quickly in case of a market event, as well enabling it to figure out how such events can impact funds individually.

"Standardizing requirements makes it easier to compare funds and gives the SEC more information more frequently. [That means] they have more to work with, so if there's a market event they can react better. That is the real benefit of the new reporting procedures," Smith says.

The SEC wanted to modernize reporting by investment firms covered by the Investment Companies Act of 1940 through the new reporting requirements. It approved amendments to rule 30b1-9 in September 2018, and introduced three new forms that will be used in the reporting process, N-PORT, N-Liquid, which will track illiquid funds, and N-CEN, a census of a company's holdings in an annual report. Large funds are supposed to start sending the N-PORT form to the SEC in May, with smaller funds—those with assets of $50 million or less—following suit a year later. Mutual funds and managers must report their aggregate portfolio holdings, including derivatives, and place them into four liquidity buckets—highly liquid investments, moderately liquid, less liquid, and illiquid—under N-PORT. Funds must also provide a narrative of their liquidity risk management processes, including any significant redemptions or risks to holdings that may affect liquidity.

Investment funds were required to start using N-CEN in June 2018, while N-Liquid will begin in June 2019. Unlike N-PORT, information from N-Liquid will not be made public by the SEC.

Reports sent to the SEC will be in XML machine-readable format, so the regulator can carry out its own analysis on the data more quickly using machine-learning techniques, such as parsing the data through an automated system to look for potential liquidity risks. ICI's Smith notes that, prior to N-PORT and the SEC's modernization exercise, much reporting was wed to PDFs, which made it difficult to glean any kind of insight in a systematic fashion, or to scrape data.

The idea behind the new forms is to paint a better picture of systemic risk within the market, especially in asset management. The SEC has been looking for ways to ensure more transparency into the potential risk for investors and wanted to ensure it has a better understanding of how each underlying investment sits within a portfolio.

Long Time Coming

The SEC and the investment fund industry have been in discussions about modernizing the reporting process for several years.

First planned for 2016, the requirements hit a series of delays, mostly due to issues around the final format and information in N-PORT. In fact, N-PORT was originally supposed to start in April 2019, but the industry had concerns over the security of its public

> "One of the challenges with any new filing requirement is giving clients the opportunity to conduct end-to-end testing to ensure each phase from data aggregation to review to filing is working properly."
> **Keith Slattery, JP Morgan**

data. Information from N-PORT will be made public on EDGAR, the SEC's company database, which was hacked in 2016. This led the regulator to announce in February 2019 that it would delay N-PORT for one month and only make information on funds public every three months. Each firm is still required to send information on the N-PORT form each month despite this new timeframe.

This moving target has been an issue for the industry, says Axioma's director for regulatory reporting, Denis Tarpey, so much so that it made it difficult for companies to fully commit to changes. Despite that, some firms had already begun the process of identifying data gaps in preparation for the new reporting requirements.

Tom Pfister, vice president of global product strategy at Confluence, says the new reporting rules have forced many companies to take a closer look into their holdings. But the industry, he predicts, is largely ready for N-PORT and SEC modernization. "Companies had to step up to enable their world to connect all of this information. They had to connect their legal team, their back end and their front end to review what data they have," Pfister says. "I do think the entire industry is ready for it now, even though new data expertise had to be built. Most regulations don't invent data points, they just ask for the information in a way clients didn't have to think of before. And since their data is not stored in a single pool, they had to do gap analysis to figure out how to make these different datasets talk to each other."

He adds that around 80% of the funds industry files through Confluence, so he has confidence that the new datafeeds, data expertise and data management

Tom Pfister
Confluence

tools built by the firm show how ready the industry is for N-PORT reporting.

Data aggregation became the most important task for firms, because so much of the necessary information is spread across the entire organization and therefore had to be tracked down. It also became important that aggregation was made more efficient just to meet the monthly deadline. ICI's Smith points out that a lot of the work prior to N-PORT was done manually, so changes had to be made. For some firms, this meant turning to automated data aggregation was the answer.

New Data Culture

The aggregation of data was not the only big issue, as firms and their vendors also had to improve data management workflows so the information that had been gathered could be called on easily and moved to the appropriate areas for reporting.

N-PORT required more work around figuring out new data workflows and connections than it did upgrading technology. Funds needed to overhaul how they dealt with the way each piece of information moved from one department to another. Despite having access to most of the information the SEC is looking for, these data points did not always "talk" to each other.

Brian O'Sullivan, senior vice president and global product owner at State Street, says it has been difficult getting all these data points together.

"A lot of the positions our clients have needed to get information that may not be easy to pull down from an account," O'Sullivan says. "They realized a lot of the work was taking data, normalizing it and then doing a report. But these are thousands of data points and no one is going to hire thousands of people to do those checks."

O'Sullivan says the bank built a tool within its N-PORT solution that checks data *en masse* for accuracy and completeness. An example of a simple check the tool does is to automatically see whether the value of collateral baked into a holding is at least 102% of the value of a loan. If not, then there might be a problem with the completeness of the data. As the industry began to work towards

> “We had to do a lot of data-gathering exercises because data came from disparate sources. We basically had to act like wranglers and try to create workflows around data management.”
> **Denis Tarpey, Axioma**

N-PORT, many challenges emerged in the process of figuring out how to get all the necessary information together in a more efficient way.

Keith Slattery, global head of traditional fund accounts at JP Morgan, says much of the challenge in getting ready for N-PORT was due to the many moving parts that had to be synchronized.

“One challenge with any new filing requirement is giving clients the opportunity to conduct end-to-end testing to ensure each phase from data aggregation to review to filing is working properly. There are lots of moving parts leading up to implementation as requirements are finalized, applications are enhanced and testing needs to be completed,” he says. “We worked closely with clients to meet the original live date of June 30, 2018, enabling an early view of the official filings and the opportunity for enhancements throughout the extended implementation timeframe granted by the SEC.”

Slattery says the bank had to ensure it had a comprehensive database of all the information needed to do its reporting to be more efficient.

“We created a comprehensive inventory of all data elements required for the filing, identified elements available from internal sources, such as our financial reporting security master database, and developed feeds from clients or third parties for the remainder,” he says. “The primary goal was to automate data capture and avoid manual touchpoints to provide straight-through processing. We worked with our technology vendor on systemic controls to ensure data completeness and accuracy.”

He adds this process helped clients identify how best to approach the new regulations, but also gave them the chance to use more standardized and automated processes so they can aggregate and validate the data that they have.

One of the biggest challenges facing firms is that this big data lift requires work they may not be able to do on their own.

Axioma’s Tarpey points out regulatory reporting is not a profit center for these firms, so part of its work as a vendor involved helping change its clients’ data management and reporting culture to share information with others in the firm.

“We had to do a lot of data-gathering exercises because data came from disparate sources. We basically had to act like wranglers and try to create workflows around data management,” he says. “Regulatory reporting is not a revenue-generating program for them, so when you put more reporting there is always pushback. The bigger issue is enacting that culture change to be able to do the reporting.”

Tarpey notes this is where the vendor community really flourished. Vendors such as Confluence and Axioma say part of the work of getting ready for N-PORT is shepherding clients through the data aggregation process, especially when this is not their core expertise.

But the best solution for smaller firms is not always the same for other fund managers. O’Sullivan says State Street wondered whether something like N-PORT should be outsourced because of the amount of data lift that was required. Ultimately, the banking giant decided to build its own solution for the use of its fund clients.

The work involved to get ready for N-PORT is expected to have far reaching benefits around portfolios, not just for the SEC but also for investment firms. N-PORT can potentially provide greater uses for the funds that have reported the information and help them understand more about each holding they have, such as using the information in N-PORT to run analysis for risk or to show liquidity when looking to raise additional funds.

O’Sullivan, for instance, says that while working with clients on the N-PORT solution, people have already asked State Street if they can have access to the report so they can use the data to gain more insights into their own portfolios, including figuring out where most of the risk lies. State Street itself can also have more data internally that it can use to help its clients better.

Regulators’ increasing interest in greater transparency probably means N-PORT will not be the only granular reporting that funds will be required to do. But with the mammoth task of data aggregation already complete, companies may be able to handle future demands much better and not have to totally overhaul workflows again. wt

Crypto at the Crossroads as Exchanges Weigh Traditional Market Structures

Questions of price discovery and centralized infrastructure point to an asset class that may have to lose its rebellious luster to become more widely accepted. By James Rundle

Cryptocurrency trading is being hailed as a disruptive force for the future of capital markets. Yet many note that it not only bears a stark resemblance to the emergence and evolution of "traditional" financial instruments, but must also adopt some of their established market structures.

While spot trading still occurs in a largely unregulated context, the real innovations that have driven the evolution of crypto market structure have their roots in "traditional" financial markets and instruments—namely, the financially settled bitcoin futures launched in late 2017 by Cboe Global Markets and the Chicago Mercantile Exchange Group (CME Group).

Now, say these exchanges and their competitors, other elements of traditional market structure are needed, such as clearinghouses and properly defined price discovery that takes place in regulated markets, in order to fully entice institutional capital into the fray.

"As physically delivered, as cash-settled products come online, as spot markets become more regulated, I think you will not only see convergence but also price discovery, which will feed into new products," said Thomas Chippas, CEO of digital asset trading platform and clearing firm ErisX, speaking on a panel discussion at the Futures Industry Association's annual conference in Boca Raton, Fla., on March 14.

ErisX plans to launch physically delivered cryptocurrency futures, subject to regulatory approval, and spot trading on the same platform. Other major players are also launching professional-grade ventures in this space, such as Intercontinental Exchange Group (ICE), via its cryptocurrency division Bakkt, which will enable futures to be traded and cleared through ICE Futures.

Speaking on the same panel, Adam White, COO of Bakkt, added that the unregulated nature of many spot exchanges is "keeping some measure of institutional capital on the sidelines."

Yet while many traders are calling for crypto markets to adopt structures that are more aligned with traditional markets, there are also many who see this as running counter to the innovation leaps enabled by technology such as the blockchain and distributed ledgers.

"I think that crypto, in the future, requires us to have fewer [of these structures]," Ron Bernstein, lead for new assets and products at crypto exchange operator Coinbase, told the panel. "I think that's the ultimate goal for decentralized technology, and I think there will be a way, in the future, to self-custodian—or at least not require a lot of centralized infrastructure."

That assertion was met with immediate opposition from others, who said that not only was trust fundamental to trading activities; it is also essential to encourage further participation in these markets.

"I don't agree with that. I don't think, when we talk about financial transactions, we need less trust," said Tim McCourt, global head of equity index and alternative investment products at CME Group. "I think that's diametrically opposed to our viewpoint when it comes to central clearing because one of the things with managing risk is you need to understand the rules and have a degree of certainty about how events will unfold when you need to manage that risk. So decentralization may be an attractive aspect of the technology, but central clearing provides the trust to get market participants to do these things that provide liquidity, and you need certainty at the point of liquidity."

> "Decentralization may be an attractive aspect of the technology, but central clearing provides the trust to get market participants to do these things that provide liquidity, and you need certainty at the point of liquidity."
> **Tim McCourt, CME Group**

Bakkt's White added that elements of centralized infrastructure are "inevitable," given the regulation that already exists around products like futures and other standardized derivatives. While decentralization does have some attraction, he argued, particularly in terms of what can be achieved through technology initiatives—including building distributed applications on top of public ledgers—some of the more extreme examples are clearly unsuitable for institutions.

"I do think that the vast majority of the capital that's waiting on the sidelines will not commit without custody or mutualized losses like in clearing. They are looking for this asset class to fit into the processes that we're used to, and that's where we'll see the most growth," White said.

Are Futures the Future?

Beyond forcing artificial structures onto crypto markets, a more organic evolution may be driving a move away from unregulated spot markets toward the traditional futures markets and their established operators.

While the launch of regulated bitcoin futures had the immediate effect of leveling out the mania around bitcoin's price—and perhaps indirectly contributing to the equally steep decline in the value of a single coin over the course of 2018—these futures are beginning to exert an indelible force on another area of the market that has challenged institutional investors focusing greater attention on crypto markets: price discovery.

"At the moment, price discovery happens primarily on the cash markets. Those are bifurcated between traditional over-the-counter (OTC) players like Cumberland, Circle and Genesis, but also the lit cash markets like Coinbase, Gemini and Kraken," said Bakkt's White. "But what we believe firmly at Bakkt is that price discovery has to occur within an end-to-end regulated ecosystem. Not taking anything away from the cash markets or the OTC markets, but they're not exchanges with a capital 'E.' So I think, right now, most of that price discovery is happening in the cash markets, but we'll see, with time, it switch to the futures market, and hopefully Bakkt will be a quote market."

Others say this switch has already begun. CME's McCourt said that there have been occasions where volumes on CME bitcoin futures—each contract representing five bitcoins—have exceeded equivalent volumes on spot exchanges, suggesting that price formation is indeed occurring in futures markets.

"When we look at some of the recent volume trends from the spot exchanges, there are some days when futures are doing more than spot in terms of bitcoin equivalent—we have a five-times multiplier at CME—last month we had a record day of a little over 18,000 contracts, which is 92,000-plus bitcoin equivalent," he said. "So, you're seeing this price formation happening."

To what extent this will continue is uncertain. Mere hours before the panel, Cboe announced through an exchange circular that it would not be listing any of its XBT futures from March onwards. While current contracts, which mature up until June, can continue to be traded, the exchange said, the question of whether it would continue to list bitcoin futures at a later date depended on internal discussion regarding Cboe's digital asset strategy. wt

With over 25 years of experience in law and shaping regulatory policy, Nausicaa Delfas is tasked with one of the biggest challenges of her career yet—tackling Brexit. Josephine Gallagher sits down with Delfas to discuss the FCA's technology roadmap and how she is navigating the regulator through this uncertain period. Photographs by Jonathan Goldberg

Regulators' jobs are incredibly complex under typical, day-to-day circumstances. Add in the political cloudiness of an uncertain Brexit and already-difficult regulatory challenges become formidable obstacles.

Fortunately, Nausicaa Delfas is well-positioned for the task.

As the Financial Conduct Authority's (FCA's) first executive director of international, Delfas is responsible for delivering the UK regulator's official position on one of the most complex breakups in political history. To captain the FCA's ship safely through Brexit, Delfas must assess technological strategies, consider data management and weigh out the risks tied to each decision.

The role is broad and sounds daunting, but Delfas says it was a natural fit.

"I have always had an international outlook. I'm of Greek heritage and bilingual, so I have always been drawn to international work," says Delfas, from a seat at a conference table within the FCA's new offices in Stratford, London.

Her role fuses the three disciplines in which she is skilled: the law, regulatory affairs, and corporate operations. Starting out as a solicitor at Magic Circle law firm Freshfields Bruckhaus Deringer, she practiced European competition legislation and financial services law, later working on the other side of the tracks, as a regulator for the Financial Services Authority (FSA) in 2000. Delfas headed up the department for enforcement, policy, and supervision for at the FSA for 12 years, before it split into the FCA and the Prudential Regulation Authority in 2013. Following that reestablishment, she swiftly climbed up the ranks at the FCA, becoming its COO in 2016. "I have tended to be attracted to opportunities where there was a reason to be innovative—setting up new areas, building up new teams and then delivering on that," says Delfas.

Responsible for strengthening the FCA's relationship with its global counterparties, determining policies and delivering its position on Brexit, Delfas is involved in the building and implementation of new systems to support the UK's transition to its new environment, both outside of the EU and the regulatory oversight of the European Securities and Markets Authority (Esma). These systems are being

Steering the *Brexit* Ship

Nausicaa Delfas

"We have had to prepare for all scenarios, including the possibility of no deal, and so if there is not a deal we will need to switch these [systems] on"

developed to accept regulatory reporting data, provide market surveillance and enable the passporting of services and funds into the UK. These technologies form the backbone of the FCA's services, and their success is crucial to helping the regulator prepare for any Brexit outcome that unfolds.

"We have had to prepare for all scenarios, including the possibility of no deal, and so if there is not a deal we will need to switch these [systems] on," says Delfas.

The Bedrock

Since its establishment in April 2013—and before, in its previous form as the FSA—the FCA has had to implement technology systems to accurately monitor UK market abuse and enforce regulatory compliance. It is responsible for regulating approximately 58,000 firms across financial services and the financial markets and functions as the prudential regulator for over 18,000 of those firms. Over the last six years, the FCA has encountered huge challenges regarding the implementation of rules and directives, most notably Mifid II—of which it was a key architect through Esma committees—which it is responsible for implementing under UK law as the country's National Competent Authority.

One of the more notable decisions that the regulator made in response to this challenge was to partner with French vendor Sopra Steria to develop the Market Data Processor (MDP) to capture, validate and support millions of transaction reports and reference data from investment firms each day. Between the platform's launch on Mifid II's January 3, 2018, implementation date, and by October 1, 2018, the MDP had processed more than 6 billion Mifid II transactions. The processor is built on cloud infrastructure and according to Delfas is one of the first iterations of a regulator turning to the technology to support critical reporting services.

As Brexit developments unfold, the FCA has had to bolster the MDP's resilience and capacity in order to deal with the anticipated influx of reports from UK counterparties.

"Mifid II is one of the biggest regulatory projects that we have had in recent times and we are working through the transition [and transfer] of the transaction reporting data, whereas instead of going to Esma, the [UK] reporting firms come to us," Delfas explains.

The FCA is currently working on six different technology projects that are "making good progress," says Delfas. Much of its technical lift is due to the shift in regulatory responsibility and supervision that will be handed over once the UK leaves the EU. In the event of a hard Brexit, the FCA is developing systems to regulate credit rating agencies (CRAs) in the UK. When required, the new platform will have the ability to register, process and supervise CRAs to minimize disruption on exit day.

In February 2019, the FCA announced that it had built a Financial Instruments Reference Database (Firds) to replace Esma's platform. Firds is a data collection infrastructure that records all of the financial instruments being reported by trading venues in a harmonized format. The reference data is used to provide market transparency, indicate liquidity thresholds and help firms determine reporting obligations. Firds is built on the new Esma schema and the two databases are expected to be identical on day one of the UK's departure from the EU.

The FCA platform will leverage a different search engine, using Amazon's Elastic Search, with the inclusion of minor changes to fields. For example, it will remove the "relevant competent authority" field, as it will no longer be required for the UK jurisdiction. The FCA has already begun feeding live production data into the database as of early March in order to have a full record of instruments ahead of the Brexit deadline. Delfas explains that from March 14 onward, the industry has been able to test the FCA's Firds publishing technology that enables users to download and reference files.

"We have been working with the industry to make sure that the connection between the industry and us will work, and it is quite a challenge," she adds.

According to Delfas, the relationship between regulators and technology is an "active partnership" in ensuring the safety and security of all incumbents, requiring the FCA to invest in innovative technologies and keep pace with the rest of the industry.

New Tech

Like its colleagues abroad and the industry it regulates, the FCA has been tasked with processing unprecedented volumes of data in recent years, putting pressure on its onsite resources. Late last year, it announced that it would be extending its partnership with Sopra Steria, which will provide application maintenance services across all of its major systems and assist in the regulator's migration to the cloud. Supported by other vendors as well, the FCA is aiming to complete its migration project by 2022.

"The FCA has always been in a position where there is constant change, whether it is a change in scope or implementing other directives. So, one of the strategic approaches that we are taking at the FCA is our transfer to the cloud," explains Delfas.

The move to the cloud has been the direction of travel for the FCA over the past four to five years, as the regulator aims to upgrade its IT systems and allow for scalability when implementing new rules. One of the first challenges was the consumer credit regulations implemented in April 2014, which handed supervision of these firms to the FCA and required it to oversee more than 50,000 new entities, says Delfas. Now, much of the work around consumer credit has been moved to the cloud in an effort to not only manage the services but improve how they operate.

To date, more than half of the FCA's systems and operations have been shifted to the cloud. Over the next two to three years, the regulator aims to gradually remove its reliance on contracted datacenters. Delfas explains that this roadmap will open up a range of opportunities to leverage the cloud's infrastructure and create bespoke

risk regarding cloud concentration and over-reliance on outsourced technology. Delfas explains how the FCA is largely supportive of the services offered by cloud and the opportunities that the technology provides but acknowledges that it is not free from risks.

"It is another form of outsourcing and from the regulatory perspective, it is the regulated firm that remains responsible for the security of its data and for its outsourcing arrangements," she says.

As more of the industry warms to the idea of cloud technology, Delfas says further discussions are forthcoming, pertaining to operational resilience and cybersecurity when outsourcing important services to third parties.

"I think the issue on concentration risk is one that we have to continue discussing going forward. The reality is that the cloud isn't just one thing. There are many different arrangements between firms and cloud providers, and it is something that I think needs further discussion as to what the risk is and how it can best be managed," she adds.

technology roles such as specialized cloud engineers and data scientists.

"It will have other benefits such as reducing cyber and operational risks as well, and enabling us to be nimble and innovative going forward as an organization," she adds.

The FCA's technological investments go beyond the cloud. The regulator uses Nasdaq's Smarts platform for market surveillance and monitoring regulatory compliance. Utilizing machine-learning capabilities and pre-configured detection algorithms, the technology can identify abusive behaviors from a vast pool of data, aggregated from multiple asset classes and trading venues—including lit and dark venues. The platform then creates insights and alerts based on its discoveries. The FCA team uses Smarts to put each alert in chronological order, to create a picture of the events that happened that day or across a series of days, allowing a view "across venues and across time," which Delfas says is a "significant" development.

"As [data] volumes have increased, [Smarts] has enabled us to then do some ad-hoc analysis and data analytics on these Mifid II datasets. I think it is important from the FCA's perspective because it enables us to discharge our objectives on market integrity better than before," she says.

Hedging Risks

While new technologies, such as artificial intelligence and cloud computing, continue to creep into the day-to-day operations of industry firms and regulators, one of the leading concerns is the growing dependence on third-party providers and the tech giants of Silicon Valley. On February 14, the Financial Stability Board published a report titled *Fintech and Market Structure in Financial Services*. It discussed how cost pressures are causing financial institutions to turn to big tech providers such as Google, Amazon Web Services, or Microsoft Azure—potentially exposing them to a new breed of

In addition to its various platforms and cloud migration efforts, Delfas is also helping to lead the FCA's charge on its international cybersecurity strategy. Cyber resilience and cross-border security collectively remain some of the biggest challenges facing financial institutions today. The FCA is actively involved in the G7 Cyber Expert Group, where it is working on a range of crucial issues, such as third-party risk, resilience testing, managing attacks, data integrity, and information sharing.

The emergence of cybersecurity as one of the extant risks of modern markets is symptomatic of the way in which technology has increasingly come to the fore for the FCA and other agencies like it, both as users and regulators. Looking back over a decade ago, the industry and its watchdogs were fixated on post-financial crisis reforms but today, the biggest challenges may lie where the old meets the new.

"Looking forward, a lot of the challenges will be around modern technologies, and both the opportunities and risks that they bring," says Delfas.

In 2019, firms are still tackling the age-old problem of legacy systems, she explains, which edges the door open for operational risks and cyber-attacks, while the uptake of advancing technologies means the newest threat to disrupt the industry is likely to come in the shape of new tech.

Yet, the greatest bugbear of the markets—and often the cause of instability—has long been uncertainty. And nothing is more uncertain than the divorce of the UK from the EU over the next few months.

The Looming Deadline

The deadline for the UK's departure from the EU was intended for March 29 when Prime Minister Theresa May triggered Article 50, but at the time of writing, the evolving political climate has cast doubt on whether this will remain the official date of exit from the European Union.

Despite this uncertainty, the FCA announced on February 1 that it had been given temporary transitional powers by HM Treasury to onshore existing EU financial regulations into the UK rulebook for a maximum of two years, at the point of exit and in the event of a no-deal scenario. To allow firms time to adapt to changes, not all regulations will be enforced immediately, and some will be phased in, although those vital to detect market abuse will be effective on day one. These include provisions within the Market Abuse Regulation, Mifid II and the European Market Infrastructure Regulation. As a result, UK firms will have to adjust their systems to be ready to redirect their reporting data to the FCA or a relevant trade repository (TR) in their jurisdiction, in order to remain compliant in a post-Brexit environment.

"Being appreciative of the fact that it's not much time for firms to make those changes, the government has given us transitional power to waive or modify some of those rules. We have issued a statement that explains that we will, for the most part, waive those rules to start with but there are certain aspects that we expect firms to change immediately," says Delfas.

> "The FCA has always been in a position where there is constant change, whether it is a change in scope or implementing other directives. So, one of the strategic approaches that we are taking at the FCA is our transfer to the cloud."

Challenging though it may be, the technical burdens of Brexit don't begin and end with counterparty firms. As it stands, regulators in both the UK and EU may encounter limitations to data sharing in a no-deal scenario. In the absence of a withdrawal agreement, the UK regulator would cease transferring data to Esma, and would no longer have access to the EU regulator's IT applications and databases. To prevent the cutoff of all data flowing between regulators, some measures have been taken. In February, the FCA agreed memoranda of understanding (MoUs) with Esma and the EU27 NCAs to enable the continued cooperation and exchange of cross-border information, and the continued oversight of credit rating agencies and trade repositories. Similarly, other MoUs have been put in place to ensure UK central counterparties (CCPs) will be recognized as equivalent under EU legislation, in order to mitigate catastrophic disruption to global derivatives markets.

"Our consultation papers reached almost 2,000 pages and there are a lot of changes we have had to put through," says Delfas. "So as a starting point, should we exit at the end of March, we will have a complete rulebook with everything onshored."

The FCA has also introduced measures to support cross-border business operations. On January 7, the regulator opened its application window for the temporary permissions regime, which will enable qualified trading and reporting firms from the European Economic Area to continue passporting its business and services in the UK for a limited period until they are fully authorized by the UK regulator. The authorization will also allow EEA-based investment funds to continue marketing in the UK.

However, certain barriers regarding data sharing have yet to be knocked through. The UK has approved the EU as adequate under data protection regulations in its efforts to help maintain cross-border data movement between firms, but as it stands the EU has yet to reciprocate this response.

"As a result of that, firms are taking steps themselves, using model clauses or other techniques throughout their restructuring to enable data flows to continue from the EU to the UK. So that is still a work in progress," Delfas adds.

Over the coming weeks and months, the FCA will continue to keep a close eye on the unfolding events of Brexit. The general objective is to prepare for all scenarios and prevent widespread disruption to the industry in the event of a no deal. In the final moments of the interview, Delfas explains that adapting to rapidly evolving environments—whether it's advancing technologies or political changes—is all in the nature of the job.

Reflecting on the last 14 months as executive director of international, she says, "I don't think that there is anything I would do differently. This is a fast-moving area of work with a lot of diverse challenges."

Looking forward, however, the biggest challenge—keeping the ship steady while navigating the murky waters of Brexit—is still ahead. wt

WatersTech's Wonder Women

Now in their second year, the Women in Technology & Data Awards highlight some of the outstanding contributions women are making in the data and technology realms across the capital markets. And while meaningful progress on the ever-emotive issue of gender equality remains slow, these awards are proof that we are moving in the right direction.

This year's Women in Technology & Data Awards were, appropriately, held on March 8—International Women's Day—at the Langham in London. On hand to present the awards was the BBC's Kate Silverton.

This is the second year that *WatersTechnology* has held these awards and, while I'd like to say that there has been a noticeable difference over the last 12 months in terms of the industry having a more balanced gender split, in truth, there has been precious little progress. These 26 category write-ups contain numerous examples of where our industry continues to disappoint, although on a positive note, the quality of this year's entries and category winners is nothing short of outstanding ... and not just because they are outstanding women, but because they are outstanding, period. Yes, the industry still has a long, hard slog ahead, but you know what they say about keeping a good woman down.

This year's final two awards—WatersTechnology's woman of the year and the trailblazer (lifetime achievement) award—were won by UBS' Beatriz Martín and Bank of America's Cathy Bessant, respectively.

Write-ups by James Rundle (JR), Jamie Hyman (JH), Wei-Shen Wong (WSW), Emilia David (ED), Josephine Gallagher (JG), Hamad Ali and Victor Anderson (VBA). wt

Victor Anderson
Editor-in-Chief

Winners' Circle

Waters honored the winners at a ceremony on March 8 in London.

Best Company for Diversity and Inclusion (Vendor)

Refinitiv

When it comes to achieving its diversity goals, Refinitiv's strategy is both inward-facing, via aggressive cultural benchmarks, and outward-facing, through the data products it releases to the market. "We firmly believe that it is important to look at our organization operationally and improve our own performance, but as a data vendor, we believe our biggest footprint and positive impact is through our products and services and the way they are used by our customers to influence change," says Elena Philipova, global head of environmental, social and governance (ESG) at Refinitiv. "So we leveraged our data capabilities in the ESG datasets and our expertise in developing unique analytics, and developed the Diversity and Inclusion Index."

Philipova says organizations around the world use the index to assess their relative performance around diversity and inclusion, to measure how effective their internal policies are, and to "aim higher" for better processes and mechanisms that are comprehensive, not just focused on gender.

As far as its own processes and mechanisms are concerned, the former Financial and Risk division of Thomson Reuters is a relatively new company, launched in October 2018, and working to establish its culture and identity. In October, Refinitiv signed the Women in Finance charter, committing to women holding 40% of the data company's leadership roles by 2020.

Audrey Campbell, Refinitiv's head of talent, leadership and inclusion, says the target is treated as "non-negotiable," an approach underpinned by the understanding that talented women already exist in the market and in the business, so the focus isn't on making a case for equality—it's about how to get there. "That's a completely different mindset, and that's quite a proactive way to look at it," Campbell says, adding that the approach takes away some of the "micro-aggression" that crops up when constantly making the business case for equality. "We're no longer asking the question about talent availability and competence—we're now asking about access and what we are doing to level the playing field systemically. It's a different kind of conversation and from my point of view, quite a progressive way to address it."

Campbell says that reaching the target is a "whole firm behavioral change program" wherein it pins down the ownership of the work it takes to get there, and hooks it into pay and reward structures so that it's a normal part of doing business. The next step, she says, is talking about leadership on a global level, determining what diverse leadership means, and what it looks like in all regions.

—JH

Phil Wellard and Kate Silverton

> "When it comes to achieving its diversity goals, Refinitiv's strategy is both inward-facing, via aggressive cultural benchmarks, and outward-facing, through the data products it releases to the market.

Best Company for Diversity and Inclusion (End-User)

BNP Paribas

For BNP Paribas, it's not a matter of whether it will achieve its diversity goals—it's a matter of when. "We recognized diversity and inclusion as being core to our success quite a few years ago," explains Vinay Kapoor, head of diversity and inclusion, Americas, for the French bank, adding that BNP Paribas "identified it as one of our 30 key operational risks."

Working toward equality is daunting and Kapoor admits that progress is slow. "These organizations [within financial services] have been around for many years and what we're challenging is a structural bias," he says, although he sees evidence of a mindset change across the industry.

Kapoor says prior to the global financial crisis in 2008, diversity issues "were not considered to be work-related" and not tied to success in the financial services industry, although that attitude has now changed. "We've seen some of the biggest failures in banking, in the whole sector, happened as a direct result of groupthink," he says, describing the financial crisis as "one of the key motivating factors" in recognizing that diversity is necessary to avoid future disasters. "We need to avoid groupthink at all costs, because that actually cost billions and billions to the industry."

BNP Paribas has the numbers to back up its progress: In the latest round of promotions announced in early March this year, 40% of the bank's new managing directors are women. In 2016, BNP Paribas achieved its goal of 30% of its top 2,000 managers to be women, and Kapoor says that it is now working on more aggressive targets to reach that percentage for the firm's top 500 managers. "We bake gender diversity into our promotions, retention and development processes," he says, highlighting sponsorship, role models and education as essential to the firm's strategy. "Sponsorship is absolutely key to bringing up emerging talent. Sponsors take an active involvement in a protégé's career, as opposed to mentoring, which can be just giving advice. Sponsorship is taking an active role," Kapoor says, adding that the bank is rolling out a sponsorship program targeting black employees.

BNP Paribas' educational efforts take advantage of local talent. In New York, for example, the firm now offers unconscious bias training, with Broadway actors role-playing real-life situations demonstrating what it is like to be a member of a minority group on a staff.

Kapoor says when it comes to diversity, the tone "comes from the top of the organization," noting that Jean-Laurent Bonnafé, CEO of BNP Paribas, is a HeForShe Thematic Champion. HeForShe is the UN Women's campaign focusing on solidarity for gender equality.

—JH

"
BNP Paribas has the numbers to back up its progress: In the latest round of promotions announced in early March this year, 40% of the bank's new managing directors are women.

Gender Equality/Diversity Professional of the Year (End-User)

Ruth MacQuiddy, Deutsche Bank

Guiding an institution the size of a tier-one bank along the road to digital transformation is no easy task. But doing so while being a champion for equality and diversity is another thing entirely. Enter Ruth MacQuiddy, who wins this year's gender equality/diversity professional of the year category in this year's Women in Technology & Data Awards held in London on March 8.

With five years under her belt at Deutsche Bank as a technology strategist in its Labs division, MacQuiddy is one of the real veterans of the fintech scene. Her job is to identify startups that could be relevant to the bank's future, and to stay abreast of technology challenges and trends that could impact the business at a future date. This role runs the gamut of emerging technology, including artificial intelligence and its various subsets, data analytics, cognitive automation and even quantum computing.

It's a role that MacQuiddy—who could not be reached for an interview while on maternity leave—is particularly well-suited for. Her background is directly related to startups, with previous roles as a management consultant for Grameen Bank, as a managing director at Rutgers University, and as the co-founder of a startup, Performance Navigation, which developed an analytics platform. Her ability to speak five languages—English, French, Italian, Spanish and Turkish—doesn't hurt, either.

Technology, of course, hasn't always been her central focus. While earning her undergraduate degree at Wellesley, she joined an a capella group focused on jazz standards—a group that would go on to perform twice at the White House.

But while MacQuiddy's work in Deutsche Bank Labs is important, her work within diversity is equally impressive. She has been a regular face for diversity at the firm, evidenced by her moderation of panels for areas stretching from highlighting LGBT women in finance at the bank's Open Forum to a fireside chat with a Google executive hosted by the bank, in part, as a representative of the bank's Diversity and Inclusion Council.

People familiar with her work both within and without the firm point to MacQuiddy's empathy, saying that she "regularly meets with junior colleagues at the bank and in finance and/or technology to offer career advice." More than that, they say, she produces events regularly to increase the diversity of voices that colleagues hear.

Last year's recipient of this award was Frieda Lewis of Broadridge Financial Solutions, who won this year's gender equality/diversity professional of the year category (*see page 38*).

—*JR*

Nataly Nieves (on behalf of Ruth MacQuiddy) and Kate Silverton

> People familiar with her work both within and without the firm point to MacQuiddy's empathy, saying that she "regularly meets with junior colleagues at the bank and in finance and/or technology to offer career advice."

Rising Star (End-User)

Irene Kan, TD Securities

Irene Kan, implementation manager at TD Securities in New York, is the recipient of the rising star (end-user) category in this year's Women in Technology & Data Awards. According to the Canadian investment bank, Kan played a pivotal role in the 2018 development and deployment of the firm's proprietary equity derivatives trading platform. The project was critical to the bank's strategic priorities and focused on increasing efficiencies via straight-through processing, ingraining infrastructure scalability and resiliency, and leveraging data to drive business value.

When it comes to Kan's developing and engineering skills—specifically those relating to her Agile expertise—the "how" is as important as the "what," with respect to the project. "I have a vendor background—I used to work at Microsoft—and I have been very involved in terms of adopting best practices, not just in banking, but in tech firms like Amazon and Facebook," she explains. "I am proud of TD Securities' commitment to this area. For example, how we do things like A/B testing and continuous integration and deployment, which are close to my heart."

When questioned as to the viability of the project using the Waterfall methodology, Kan is undecided. "Yes and no," she says. "We have been delivering projects for a long time [using the Waterfall methodology], but Agile allows us to realize goals sooner. I think one difference is that in banking, regulations change a lot, which means that we have to constantly incorporate new requirements in order to meet those regulations. If we had used an old methodology like Waterfall, we would not have been able to adapt as easily to those changes."

As for the makeup of her team, Kan explains that just under 40% are women, including a number of her lead developers, an impressive gender-based split. "But that is something that just happened—I didn't force it," she says. "To me, strong women attract strong women."

TD is well known for its Associate Program, a formalized framework by which it seeks to identify and attract the best possible graduates from a number of the top schools in the New York and Toronto areas. "Once they join TD, they do four rounds of vocational training with different business units so they can see firsthand what those parts of the business actually do," Kan explains. "Often, my role is to act as a mentor—to reassure them, to help them understand what to expect and to support them as they explore the opportunities that TD has for them."

—VBA

Irene Kan, Tamsin Hobley (SIX), and Kate Silverton

> Kan played a pivotal role in the 2018 development and deployment of the firm's proprietary equity derivatives trading platform.

Rising Star (Vendor)

Payal Jain, Indus Valley Partners

Payal Jain, a senior software engineer at Indus Valley Partners, wins the rising star (vendor) category at this year's Women in Technology & Data Awards. Jain is the acting lead of a team of seven that works on development and products for asset managers, particularly around IVP's reconciliation platform. She rose to this position after starting at IVP as an associate software engineer in 2014, and after little more than a year became a core member of its development team. Much of her experience in technology has resulted from on-the-job training and experimentation, she says. Today, she works with emerging technologies like artificial intelligence (AI) in the development of IVP's products.

Despite a lifelong inclination toward technology, Jain wasn't particularly interested in AI and machine learning, although she credits the company's experimental environment as piquing her interest. "At first, it was not something that initially intrigued me, but it was something that the company's experimental culture has infused within me," she says. "IVP has always been supportive, especially when it comes to experimenting with new ideas that could potentially benefit clients or improve productivity and user experience."

Jain adds that working with AI has been challenging, although through constant experimentation with her team, they have been able to automate break resolution in IVP's reconciliation offering. She says she has always been inclined to work in technology, especially since she took up computer science in college. That inspired her to complete a graduate degree in the same field so that she could learn about the latest technologies. "The path to where I am today was quite interesting and challenging," she says. "Initially, I found that it was quite tough to be at par working with the best minds in the industry and at the same pace, but I gradually adapted and thrived. What I've learned is that patience and hard work is the key to success. You always have to keep yourself motivated so that team members around you can sense positivity and enjoy working together as a team, thus ensuring quality work output with a work–life balance."

Working in the financial technology industry has helped Jain see the direct impact of the work she does. The new technology she gets to work with and help design brings about changes to the way things have traditionally been done.

Jain explains that her responsibilities not only include analysis, developing a plan to upgrade functionality and meeting with clients, but also mentoring those in her team. She notes that it's important to implement mentorship programs that focus on the value of existing technology and clearing out myths in the industry.

—ED

Payal Jain and Kate Silverton

"Working in the financial technology industry has helped Jain see the direct impact of the work she does. The new technology she gets to work with and help design brings about changes to the way things have traditionally been done.

Gender Equality Professional of the Year

Frieda Lewis, Broadridge Financial Solutions

Frieda Lewis, chief commercial diversity officer at Broadridge Financial Solutions, is this year's gender equality professional of the year. Lewis, with 30 years in business, began her career as a Broadridge client while working at several broker-dealers. She joined the firm in 2008 as a managing director for global relationship management, allowing her to strategically interact with other firms. From the beginning of her Broadridge tenure, she has worked with and sat on boards for organizations that work to increase diversity across the industry. "We need more understanding of the need for diversity, but we are already seeing an impact," she says. "Internally, we see diversity driving positive outcomes and when we engage with employees, they see that they have a positive impact to the business."

Broadridge addresses diversity with precision: It tracks how many women within the firm are in lower-, middle-, and senior-level positions and notes how many have been hired, promoted or left the company. Lewis says seeing the statistics keeps the diversity group, and the company itself, accountable. "Diversity is an evolution because when we started the programs, it was kind of ticking a box, but as research evolved it became more apparent to the senior executives that women in senior positions are impactful," Lewis explains. "The executive team has really embraced sponsorship."

The work Broadridge does to improve its diversity came about from internal soul searching, according to Lewis, who says the company has acknowledged its shortcomings and holds quarterly town halls with employees to get more diverse voices to the forefront. She ensures that she works with the senior executives, as this sends a message from the top down that diversity is important to the company. This move has allowed Broadridge to increase its diversity quotient to 58% for both women and people of color, according to the company.

Lewis' experience gained by meeting with clients has also helped shape Broadridge's diversity and inclusion programs, she explains. She says that sharing best practices allows the company to hone in on potential programs it can undertake to retain and train more women and other minorities. She is also a big proponent of mentoring and sponsorship programs.

Lewis says that a greater focus on science, technology, engineering and math in early education goes a long way toward helping girls develop an affinity for technology and data, while placing women on hiring boards will help to eliminate unconscious biases in the hiring process. "This is the culmination of my career—if I can make a difference in someone's career then that makes me feel really good," Lewis says.

—ED

Frieda Lewis and Kate Silverton

> "Lewis ensures that she works with the senior executives, as this sends a message from the top down that diversity is important to the company. This move has allowed Broadridge to increase its diversity quotient to 58% for both women and people of color.

Technology Innovator of the Year (End-User)

Pinar Emirdag, State Street

As someone who has always been interested in observing how changes in the market happen, Pinar Emirdag is a natural fit to work in innovation. Her win in the technology innovator (end-user) category at this year's Woman in Technology & Data Awards is testament to her affinity for innovation.

Emirdag, senior vice president and head of digital product development and innovation at State Street, entered technology through academia. She worked on quantum field theories using supercomputers at Brown University where she earned her doctorate. Her first foray into financial technology was on the electronic trading side, and developing smart order routers. "I'm interested in technology, but I see it as a tool and enabler that provides a competitive advantage," Emirdag says. "The financial services industry is regulated, so you have to think about the playing field. I've always been interested in market structure and what the information means."

Emirdag initially focused on trade execution where she worked on data analysis and best execution, honing her interest in market structure, particularly its future state. It is this interest that informs much of what she does at State Street.

Her role is to assess the products and services the firm can offer its clients using next-generation technology and how these technologies can also help the business. She first became fascinated with blockchain and its possible use-cases back in 2013 and since then she has sat in many groups promoting the technology. "The first principle we think of when talking about innovation is to go back to basics because there are many trends out there," she says. "It has to be driven not just by technology but whether it meets clients' needs. The second piece is a business case, anchoring the product to the use and not starting out with an innovative technology."

According to Emirdag, State Street has a strong mentorship culture and encourages employees early on to be interested in leadership careers. For her, the company's focus on diverse qualities is good for a team that focuses on innovation. Her team comprises people with different expertise and works across the organization to pinpoint any issues that may be solved with new technology. Most of all, Emirdag believes that different roles within technology require diverse qualities. "One overarching thing is that being in technology is not just doing coding—there are different careers. Like communication, it can be fun bringing different ways of thinking together," Emirdag says. "Having a beginner's mind and asking the right questions is also important, and that has been rewarding for me."

—ED

Pinar Emirdag and Kate Silverton

"Emirdag initially focused on trade execution where she worked on data analysis and best execution, honing her interest in market structure, particularly its future state. It is this interest that informs much of what she does at State Street.

Exchange Professional of the Year

Julie Holzrichter, CME Group

These days, the Chicago Mercantile Exchange Group's (CME Group's) markets are more or less completely electronic—in fact, more than 85% of trades on the Merc's books originate electronically. With that in mind, it's a little ironic that one of the exchange's longest-serving employees, who now spearheads its electronic and technological strategies, started in circumstances that couldn't be further removed.

As an 18-year-old college student with aspirations of studying international law, Julie Holzrichter—who wins the exchange professional of the year category in this year's Women in Technology & Data Awards—had her first brush with finance in a way that seems arcane even just two-and-a-half years after the CME closed the last of its open-outcry pits: She worked as a market reporter for lean hog trades, recording bid and offer prices during trading sessions.

She never looked back, either from finance or from operations, telling the *Chicago Tribune* in 2008 that she was, by nature, "a problem solver." A couple of years later, she became an options market coordinator and quickly moved into supervisory and management roles, initially in the currency complex and later in trading floor education. With the exception of a short period from 2003 to 2006 to raise her children during their early years, Holzrichter has run the gamut of roles at the CME over her entire career, from integrating the Globex electronic trading platform during the 1990s through to her current responsibilities as COO.

In this role, she runs CME's markets on a daily basis, leading the firm's trading floor, datacenter and co-location operations, business continuity strategy and security functions. She also continues her association with Globex by leading the Global Command Center, the point of contact for clients using the platform, which processes trades with a notional value of more than $1 quadrillion each year.

Now, her expertise in technology and data will be truly tested, as she oversees the integration of NEX Group—the technology and electronic markets business that split from Icap following the sale of the interdealer broker's voice-trading components to rival Tullett Prebon in 2015. The CME Group bought the company in 2018 for $5 billion, the Merc's largest acquisition in more than a decade, which closed in November of that year. NEX will give the CME Group a commanding position in US Treasurys trading, in addition to the dominance of the Traiana and TriOptima businesses in post-trade services. Meshing that technology with the CME will be the type of task suited for an operations specialist of Holzrichter's pedigree.

Holzrichter's win in this category follows that of Karen O'Connor, COO of trueEx, in 2018.

—JR

"Holzrichter has run the gamut of roles at the CME over her entire career, from integrating the Globex electronic trading platform during the 1990s through to her current responsibilities as COO.

Consultant of the Year

Michelle Feinstein, BNY Mellon Pershing

Michelle Feinstein wins the consultant of the year category at this year's Women in Technology & Data Awards. As the director of technology client engagement at BNY Mellon Pershing, she is responsible for formulating and communicating Pershing's technology strategy, and consulting with broker-dealers and advisory firms.

She and her team engage with clients, support new business development efforts, and act as experts on Pershing technology solutions available to advisors and investors.

In her 25-year career, Feinstein has worked in technology—specifically product strategy and development, business development, and relationship management roles. This has provided her with the opportunity to work with many different types of firms within wealth management, and has helped her to understand their specific challenges and focus areas. "My passion has always been about helping clients understand how to best leverage technology to become more efficient, deliver great experiences, and power their brands in the market," she says.

According to Feinstein, she naturally gravitates toward opportunities that allow her to learn and become an expert on new solutions. Additionally, she says, she particularly enjoys sharing her knowledge with others as a communicator and storyteller. She finds that her passion is most apparent when she is able to help firms understand how emerging technology can be applied within their organizations and how it can redefine their value and service.

Before any engagement, be it a client meeting, consulting engagement or even an internal meeting, Feinstein ensures that she is properly prepared. "This means doing the homework, knowing the client, studying the competition and the market, collaborating with others, and always being willing to help," she says.

Prior to her current role, Feinstein was a business development director at Albridge, an affiliate of Pershing, which generates more than $90 million per year in revenues. During her four-year tenure at Albridge, she signed more than 50 relationships worth cumulatively over $5 million in both new and recurring revenue. These related to solutions covering document management and workflow, compliance and monitoring tools, compensation management, data warehousing, custom website development, and staff augmentation. Before that, she was responsible for a team of 10 product managers at Pershing, responsible for liaising between broker-dealers and technology resources for the advisor desktop and custom website development efforts.

Feinstein pushes her team to strive for excellence, creativity and differentiators that will set BNY Pershing apart, and she plans to continue to improve her own performance by refining her approach as a technology consultant.

—WSW

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Engineer/Programmer of the Year

Maureen Buotte, Eagle Investment Systems

Maureen Buotte, head of site reliability engineering at Eagle Investment Systems, a BNY Mellon company, takes home the coveted title of engineer/programmer of the year at the 2019 Women in Technology & Data Awards. Buotte joined Eagle through the acquisition of ITS Associates back in 2001.

Site reliability engineering is part of Eagle's private cloud, Eagle Access, the firm's core platform and its primary software delivery channel. Buotte says the automation and orchestration she and her team have developed have allowed Eagle to grow as a company, further fueling her love of technology.

Learning to code in multiple programming languages is no easy feat, but Buotte has managed to learn about 25 of them. Of those, C is her favorite because the first useful software products she worked on were written in C. "I also used a lot of Perl for early products and have worked with Java, Python, and Node.js more recently," she says. "Similar to technology, knowing the language is one thing, but knowing when to use it effectively is the important part. All of the languages have their own advantages and certain situations where they would be the optimal choice," she adds.

Working in an age when current information will be outdated in the next two to five years, Buotte says that it pays to be curious and interested in the latest developments in the field. "That's why I'm always interested in learning new languages, and I continuously take online courses throughout the year to keep my knowledge up to date," she says.

When Buotte first started her career with ITS Associates (which later morphed into Eagle Access), she was the only female engineer. Sometimes, people were surprised that she was the lead engineer in the room. "As one of the only women in my engineering school, I was accustomed to feeling outnumbered, but recognized the need to change the status quo," she says. Buotte explains that she has come to realize how important mentorship and diversity are for both the growth and transformation of Eagle's software. She was able to turn her challenge into an opportunity, which has led to much of her success.

One of the challenges many engineers face is when projects fall into a "black hole" and they never get to see the results. She owes her success to learning how to add value and deliver solutions quickly. "By doing that, I've been able to keep projects alive and make sure they don't fall through the cracks," she says. "I've found success by keeping a clear view of where we're going and measuring and showing progress."

—WSW


Maureen Buotte and Kate Silverton

"Buotte says the automation and orchestration she and her team have developed have allowed Eagle to grow as a company, further fueling her love of technology.

Legal/Compliance Professional of the Year

Miranda Morad, MarketAxess

MarketAxess' Miranda Morad takes home the title of legal/compliance professional of the year at the 2019 Women in Technology & Data Awards. As general counsel for both Europe and Asia, she oversees all regulatory, legal and compliance matters for the firm's electronic bond trading platform and its subsidiary and regulatory solutions provider, Trax.

Morad's expertise in regulation has helped the firm and its clients comply with Mifid II's various tenets, as well as their preparations for the Securities Financing Transactions Regulation and Central Securities Depositories Regulation. She has also helped the firm grow in the Asia-Pacific region, working with the Monetary Authority of Singapore to secure approval for MarketAxess to function as a recognized market operator in the country.

Morad says the work she does is intellectually stimulating, varied and rewarding. "I'm working in a time of extraordinary regulatory and political flux in Europe and in an industry that is increasingly complex from a regulatory perspective," she says. She admits that getting to where she is has not been an easy ride. "I went back to square one several times," she says. In her second year after qualifying as a litigation lawyer in the UK, she immigrated to Israel, learned Hebrew, qualified as a lawyer there, and started her career again, this time in private equity. "I took my Israeli bar exams when my second child was eight months old," Morad explains. "After eight years, I returned to the UK with two toddlers and a third on the way. To help pay the bills, I had to go back to work soon after my third child was born. It was 2007, just before the financial crisis."

Morad found private practice unforgiving, so she started her career again as an in-house lawyer, this time in the financial services industry. It is here where she found she could achieve her potential and add value. Though she had to learn from scratch how the industry functioned, she realized that it was only a matter of time, experience and application before she was able to fully understand it.

Morad credits much of her success to several individuals that have influenced her throughout her career, including Ashok Chandrasekhar from Goldfarb Seligman in Israel; Peter Martin, who worked with her at Berwin Leighton Paisner; and her current boss, mentor and sponsor, Scott Pintoff, global general counsel of MarketAxess. But the biggest influence on her professional career and life in general, she says, is her father who taught her one rule, which she believes is essential for any lawyer: Never, ever, compromise your integrity.

—WSW

Kate Silverton and Miranda Morad

"Morad's expertise in regulation has helped the firm and its clients comply with Mifid II's various tenets, as well as their preparations for the Securities Financing Transactions Regulation and Central Securities Depositories Regulation.

Winners' Circle: Miranda Morad, MarketAxess

Women in Financial Services: The Shameful Truth

Miranda Morad, general counsel for Europe and Asia at MarketAxess, won the legal/compliance professional of the year category in this year's Women in Technology & Data Awards. She chats to Victor Anderson about her entry to the financial services industry, the shameful truth regarding the numbers of women across the industry, and the regulatory issues currently on her radar.

Q How did you get into the industry? Was ending up in the financial services industry always part of your plan?

Miranda Morad, general counsel (Europe and Asia), MarketAxess: Not at all. Originally, I qualified in international arbitration and worked on international border disputes. But I was brought up to believe that work needs to facilitate life, not the other way around. Along the way, I spent time as private equity lawyer. I also qualified as an attorney in Israel, and eventually ended up in-house in financial services in the City of London. I would never have thought I would have ended up in financial services, but now that I am here, I love it and have found my niche. I suppose the lesson is that there are barriers to entry which may be stronger in their perception than reality.

Q Have you noticed much change in terms of the financial services industry offering a more level playing field for all participants, irrespective of their gender?

Morad: Sadly, no. The financial services industry has a very long way to go. No one should shy away from that truth. Often in meetings, I do a quick calculation of the percentage of women present; 20% is normal, but anything over 30% feels like a rarity. The ratio is usually better if the focus of the meeting is not the front line—which I suppose speaks for itself. Today I had a business meeting with four attendees, all women. It was so unusual, I had to take a moment to call it out and celebrate it.

Recently, I was in a meeting of 40 or so business leaders in financial services. I was one of only two women at the table and four in the room—the other two were taking minutes. It was, and is, shameful.

Q To what extent does MarketAxess have a formalized framework to attract talented women and ensure that they are provided with the best possible opportunities to realize their potential to the ultimate benefit of the business?

Morad: We don't have a formalized program yet, although one is in development, but it is an important focus of our leadership team. I am proud that my team has a 50/50 gender balance, although of course US Supreme Court Justice Ruth Bader Ginsburg wouldn't consider that to be anywhere near enough. She famously said that it would only be enough when there were nine women Supreme Court Justices—after all, no one raised a question about there being nine men.

Q To what extent are you able to act as a role model/mentor within the business and the wider business community?


Miranda Morad

Morad: I believe strongly in mentorship and sponsorship. I'd like to think I have something to offer as a mentor or role model beyond my gender. It's not only women who face challenges, but we can bring what we learn in overcoming those challenges to the table, in the interests of everyone. I'm interested in having a team where each individual can achieve their full potential as an individual and as a professional without one needing to cancel out the other, regardless of gender.

Q Do you have any role models that you find particularly inspiring as a woman working in what is ostensibly still a man's domain?

Morad: I'm sad to say I have never had a female boss or professional mentor. In fact, I find it hard to recall a single situation in my entire professional life where another woman was the most senior individual in the room. That's not to say it doesn't happen, but that it is all too rare. Instead, I seek inspiration and support from female friends and colleagues and look to share their insights with the women with whom I work.

Q We are in uncharted waters with respect to Brexit and what it might ultimately mean to market participants. To what extent does Brexit feature on your radar from a business and legal perspective?

Morad: Brexit has swallowed the past two years with increasing voracity, but it is not our only focus. It features more highly on my radar than the rest of the business globally, which is probably right. Charting the path through the uncertainty is both frustrating and challenging, not to mention costly for business. If nothing else, it has meant we need to be ready for any outcome. At MarketAxess, we moved early and made decisions within a few months of the referendum, and it was the right thing to do. Now we are in a position to look ahead beyond the challenges of Brexit. wt

Risk Professional of the Year

Mire Cardenas, Axioma

Mire Cardenas, global head of client services for Axioma's Risk Solutions group, wins the risk professional of the year category in this year's Women in Technology & Data Awards. Cardenas, who joined Axioma in February 2017, is based in London and has over a decade of experience in the financial services industry, focused primarily on multi-asset risk and attribution solutions. Her day-to-day responsibilities entail the design and management of the key elements of customer experience, including customer onboarding, new product development and communication, and inquiry management.

During 2018, Cardenas focused on improving operational performance while helping to shape product development, research agendas and quality-assurance processes. She designed and delivered a transition strategy from a regional to a global service model, while also playing a pivotal role in the deployment of enhanced multi-asset and fixed-income risk models, a significant revenue source for Axioma.

Cardenas explains that from a risk perspective, she has noticed clients embrace technology-based solutions, which the firm hasn't seen much of in the past. "It's all about being cost-efficient and scalable," she says. "Before, even with smaller firms, you would see different desks using different solutions. Now, with the pressure to maintain margins and with fees dropping, there is a move toward consolidation."

Another of Cardenas' ongoing priorities is developing a new user interface (UI), coupled with application programming interface (API)-based applications as a means of enhancing user-friendliness and application interoperability. "For us, it is a push to move more of our clients to API coding, which is a lot more flexible, a lot faster and allows a lot more functionality," she explains. "Most of the new implementations we are doing will be on APIs. In terms of the UI, that is something that will come in stages with different deliverables and modules delivered accordingly."

On the issue of whether women outpace their male counterparts in roles like client services that hinge on establishing and maintaining close working relationships, Cardenas is noncommittal. "Axioma is full of talented people—interpersonal skills are not something unique to women and a lot of my non-female client-facing colleagues have these relationship-building skills as well," she explains. "Generally, one thing that sets women back is that we tend to be a lot less confident than men about what we know and what we can do. That is changing, but when I first started my career, it was pretty unusual to see a woman working in analytics; people would assume that women only have administrative roles or something that had to do with people."

—VBA

"Cardenas designed and delivered a transition strategy from a regional to a global service model, while also playing a pivotal role in the deployment of enhanced multi-asset and fixed-income risk models, a significant revenue source for Axioma.

Data Science Professional of the Year

Amanda Stent, Bloomberg

When it comes to data, what fascinates Bloomberg researcher Amanda Stent, recipient of the data science professional category at this year's Women in Technology & Data Awards, is how much information is available today that was inaccessible not long ago. In fact, it was a very different picture when Stent completed her PhD from the University of Rochester in 2001. She recalls how difficult it was at the time to get the knowledge base for any kind of information. "Now, increasingly, we do have that information," she says.

Her dissertation was in natural-language generation for dialogue systems. After earning her PhD, she stayed in academia for the next eight years and continued to work on dialogue systems, as well as look at other linguistic phenomena like adaptation, which focuses on how when two people are speaking, the more they interact the more they mimic one another in terms of the words they use and the way they communicate.

She later worked in research roles at AT&T Labs and Yahoo before joining Bloomberg in 2016. Stent sees her mission at Bloomberg as ensuring that all the natural-language processing at the organization is performed consistently. That includes managing and doing research into text analytics.

Bloomberg processes approximately 2 million news articles every day. Many of those articles are not labeled by a human. "We need machine-learning models or rules, and we need some way to enrich them so we can get out the information we want—market signals, facts and events," she explains. "And to do that you still need to annotate, you need to manually label data to train the models. That is where some of the current challenges are. Which data do you label and how do you label it?"

Stent is a board member of the Committee on the Status of Women in Computing Research. When it comes to the proportion of women in computer science, Stent sees a mixed picture. She points out that the percentage of women in the field has been steadily declining since it peaked in the early 1980s to today where it is currently about 17%. "However, there are more women in computing adjacent fields like data science or applied math," she says. "That is encouraging and those women can often be converted into computing researchers. You think the percentage of women is appalling? The percentage of under-represented minorities, which in the UK probably means something different to the US, is less than 5%. How can we have a field that touches every part of society, when not every part of society is involved?"

—HA

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Stent sees her mission at Bloomberg as ensuring that all the natural-language processing at the organization is performed consistently. That includes managing and doing research into text analytics.

EDM Professional of the Year

Pam Hueston, Xenomorph

Xenomorph CFO Pam Hueston, winner of the EDM professional of the year category in the 2019 Women in Technology & Data Awards, has an airtight excuse for not picking up her award at this year's lunch in London on March 8—she was on maternity leave. Speaking on Hueston's behalf, Xenomorph COO Robert Ottley says that as the firm's finance chief, she has a "big say" in how the company is run and ensures "the balance sheet is good and fit for purpose for the company."

Hueston joined Xenomorph as an adviser to the board toward the end of 2016 and has since helped guide it through a recapitalization process, earning the appointment of CFO in 2018. Ottley describes Hueston as "very personable, very open and honest, professional, quite focused and structured," noting that she and her financial support administrator have upgraded Xenomorph's systems and introduced new procedures and processes. He says currently, Xenomorph's staff is heavily skewed toward men, something the company's leadership is determined to change. "We want to become a lot more diverse than we are," he says. "We want to hire the best people into the roles, but I think historically, it's been considered a space for men as opposed to women and it never should have been that way, so we want to make sure it's much more of a diverse culture."

Ottley says as a C-level employee, Hueston is "part of that change."

Xenomorph was acquired by a venture capital business about a year-and-a-half ago, a move that Ottley says is prompting the data management solutions vendor to "change to something a bit more dynamic, a bit more market-facing. Pam is instrumental in that—she's part of that process," he says.

Hueston may be well-suited to pioneering a shift toward equality, because as noted in her awards entry, she has worked as a financial professional within a number of traditionally male-dominated fields, including mining and IT. Prior to that, she led teams of forensic accountants at Deloitte & Touch, based in her native Canada.

Hueston is a qualified chartered accountant, a chartered professional accountant and holds a master's degree in business administration from the University of Cape Town and an honors accounting degree. "She's been very, very good for us," Ottley says. "You need a strong CFO to run a business which is going through change, and that's what she is, a strong woman."

—JH

"Hueston may be well-suited to pioneering a shift toward equality, because as noted in her awards entry, she has worked as a financial professional within a number of traditionally male-dominated fields, including mining and IT.

Market Data Professional of the Year

Emily Kasparov, SIP Operating Committees

As an associate general counsel and corporate secretary of the Intercontinental Exchange's Chicago Stock Exchange, Emily Kasparov has a lot on her plate, by any measure. But it's her work as chair of the SIP Operating Committees (OCs) that has helped land her the title of market data professional at this year's Women in Technology & Data Awards held in London on March 8.

In 2015, Kasparov became the youngest person and the first woman elected to the position, and during her tenure she has transformed the OCs' operational processes. Since taking up the role, she has implemented effective governance—demonstrated by her management of committee meetings, her efforts to champion market data transparency, and her ability to drive technology enhancements to support the group's responsibilities.

The SIP OCs comprise an involuntary consortium of organizations divided into the combined Consolidated Tape Association (CTA) and Consolidated Quotation System (CQ) SIP, and the Unlisted Trading Privileges (UTP), comprising 15 equity exchanges, advisors, legal representatives, and the Financial Industry Regulatory Authority (Finra). Over the past four years, Kasparov has overcome the significant challenge of acting as the glue combining these competing businesses and organizations to facilitate communication, promote market data sharing, set concrete policies, and oversee administrators and processors. She explains that today, the OCs no longer resemble a closed community where the public had little or no understanding of how exchanges or market data providers operate. As part of her initiatives to promote transparency, exchanges are now obliged to publish quarterly revenues and disclose the calculations in a simplified format. "My vision was to improve the OCs' processes so that people could effectively and efficiently perform their duties under the National Market System Plans," she says. "At the same time, the goal was to improve the transparency and public confidence in the SIPs."

Under Kasparov's leadership, the SIP OCs have worked to upgrade their technology, the backbone of the consortium. As part of the group's initiatives, she has created sub-committees and allocated taskforces dedicated to improving the delivery, capacity and resiliency of the SIPs' infrastructure—whereby the CTA/CQ is based on the New York Stock Exchange's listed securities and the UTP is based on Nasdaq's listed securities. Given the limited representation of women in the industry, Kasparov has also founded a women's group at the Chicago Stock Exchange and promoted conversations around helping women enter the industry. And what would she advise other women in what is still a male-dominated industry? "Make your voice heard and don't be afraid to get things wrong," she says. At press time, the SIP OCs announced that Kasparov was stepping down as chair.

—JG

Kate Silverton and Emily Kasparov

> "Since taking up the role, Kasparov has implemented effective governance—demonstrated by her management of committee meetings, her efforts to champion market data transparency, and her ability to drive technology enhancements to support the group's responsibilities.

Reference Data Professional of the Year

Louise Green, Bureau van Dijk

Having the right data, especially reference data, is crucial for firms to make more judicious business decisions. Louise Green, managing director for marketing and communications at Bureau van Dijk, a Moody's Analytics company, wins the reference data professional of the year category at the 2019 Women in Technology & Data Awards.

Green, who has been at the firm since its inception in 1991, manages various functions, including thought-leadership creation, sales enablement, communications, knowledge management and demand generation. These functions provide clarity with respect to how reference data can be used to make faster and better business decisions.

Orbis, the firm's flagship offering comprising over 300 million entities spread across a large number of countries, helps capital markets firms to make more informed decisions. Green explains that the data within Orbis is standardized with cross-references so that it is easier for clients to compare companies globally. It also contains complementary data to provide a more holistic view of an entity, and has extensive information on how companies are linked and their ownership structures. This helps user-firms understand a company's scale and its affiliations, which could potentially present them with unforeseen risks. Over the next few months, Orbis will grow its database by a further 30 million companies, according to Green.

In 2018, Green's team led several successful campaigns and webinars that increased Orbis' visibility, resulting in higher revenues and market interest in the database. She also played an instrumental role during 2017 as one of the firm's key presenters to potential acquirers, before the firm was ultimately bought by Moody's Analytics.

One of the challenges Green has had to deal with during her career is the range of use-cases for reference data, which are constantly evolving. Agile learning, active listening and critical thinking are vital in this context, so she strives to ensure that her technical knowledge is up to date. "Bureau van Dijk has had, and continues to have, great leadership," Green says. "The importance of data—quality, scope, depth, etc.—is central to the business, and Bureau van Dijk is all about delivering the best company and entity database. This company-wide aspiration and the range of knowledge in the business continues to inspire and motivate me," she says, referring to those who have helped her over the years.

Green learned early on in her career that the "why" with respect to clients is important. She therefore persists with her colleagues in the firm's sales and product teams until she has the information she needs to understand what customers are trying to do and why.

—WSW

Louise Green and Kate Silverton

> Green, who has been at the firm since its inception in 1991, manages various functions, including thought-leadership creation, sales enablement, communications, knowledge management and demand generation.

Startup Professional of the Year

Sunaina Swaminathan, M Science

Sunaina Swaminathan, winner of the startup professional of the year category in this year's Women in Technology & Data Awards, has a special talent for finding valuable data in faraway corners of the world. Her firm, M Science, is a research and analytics company that works with various kinds of datasets such as credit and debit transaction data, location data, mobile app intelligence, and click streams. It combines these datasets to create a mosaic, which in turn helps analysts predict how firms are performing. This information is typically used by institutional investors and large corporations.

As head of data acquisition at M Science, Swaminathan's task is to source datasets that can provide unique insights for clients. One of her first major wins at the firm was a data provider she discovered in China at the end of 2016 that focuses on data covering the penetration of cellphones in Asia. The provider collects data via apps on handsets indicating device purchases, allowing it to accurately calculate the number of Apple or Samsung devices sold in a given month, information used to gain insight into manufacturers' market share. "We are still using that dataset," Swaminathan says. "It has been two years and we have literally just renewed the contract. We are combining that with other additional datasets. We are adding more coverage to it and we're working with another data provider right now to include data from Europe and Latin America, so it encapsulates the entire world."

One of the challenges of her role, says Swaminathan, is getting to talk to people with unique datasets. "I am afraid it is getting to be a little commoditized," she says. "I am trying to find quality over quantity. So those are definitely challenges you see every day."

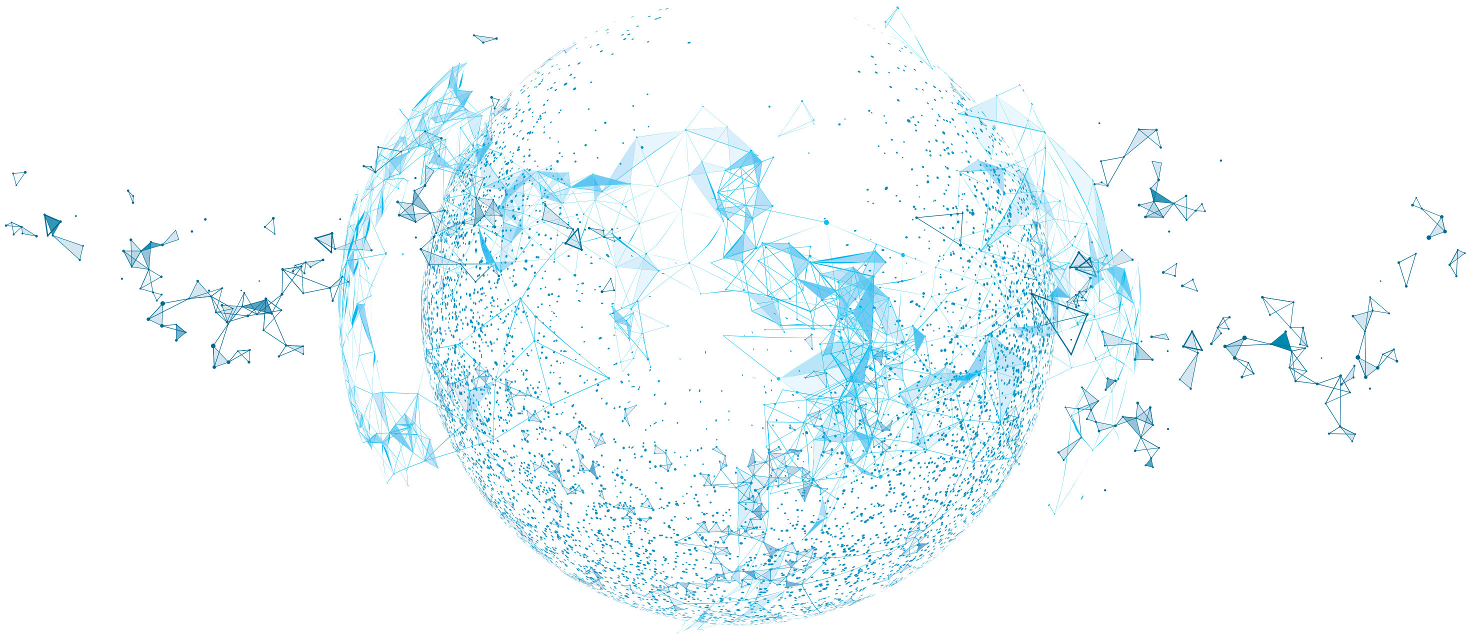
Swaminathan has noticed more women being recognized and growing into leadership roles in the financial services industry. Last year, she herself was promoted to the executive management team at M Science and now reports directly to the firm's CEO.

She says the industry is heavily male-dominated and would like to see the inclusion of more women. At a recent conference she attended in Berlin, she says less than 20% of attendees were women. Swaminathan partners with Women Who Code, an international non-profit organization that promotes women in the data and technology industries. "I think we are now starting to see more women taking ownership and leading the charge, rather than just being enablers," she says. "That is what I am seeing—it is starting to happen."

—HA

Sunaina Swaminathan and Kate Silverton

> One of Swaminathan's first major wins at the firm was a data provider she discovered in China at the end of 2016 that focuses on data covering the penetration of cellphones in Asia.



Support Professional of the Year (Vendor)

Meena Jeenarain, Abacus Group

Meena Jeenarain, director of client services and winner of the support professional of the year (vendor) category in this year's Women in Technology & Data Awards, believes one of the necessary qualities of an effective project manager is to be open to ideas. Jeenarain joined Abacus Group in 2014 with the goal of shaping how projects were being managed. One of the challenges was to bridge the gap between the engineering team and the support organization when onboarding clients. Once an engineer had completed the project there was no clear definition regarding how they were going to support it. The result was that the support team would come up with its own processes and procedures.

Jeenarain had to take a step back to look at any gaps in the process and develop new workflows. As the organization grew in size, it began to segregate its project teams. This meant separating the project managers from the engineers and later bringing them together during the onboarding phase. "We didn't only focus on how to implement a project, but looked at the problems and the experience—that was an important thing for us," Jeenarain explain. "What were the client experiences throughout the phases of the project? How do we take requirements? How do we not be intrusive on their day-to-day [activities]? How do we onboard them, and if they already have an existing IT organization, how do we recognize that they still need to work and trade, and how do we make sure there is minimum downtime for them?"

One standout project Jeenarain was involved in was onboarding a large client during 2018 that had a complex infrastructure and global offices. The aim was to have minimum downtown during the cutover. "At the end of the day, it was challenging," Jeenarain recalls. "We planned and planned and re-planned. We looked at the risks and planned for those risks, but it was very fulfilling when it was done. The project management team learned so many lessons from that project that we went back and re-invented our process to accommodate for big clients like that and various time zones."

Jeenarain says she would like to see more women working in technology. "I don't know if many women realize how exciting and fulfilling the technology field is," she says. "You get exposed to all the new software that is coming out and you learn how impactful technology is on a day-to-day basis. You can't do anything anymore without understanding technology."

—HA


Meena Jeenarain

> One standout project Jeenarain was involved in was onboarding a large client during 2018 that had a complex infrastructure and global offices. The aim was to have minimum downtown during the cutover.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Technology Innovator of the Year (Vendor)

Regina Williamson, London Stock Exchange Group

In just two short years, Regina Williamson has earned her stripes at the London Stock Exchange Group (LSEG). As technical product manager, she oversaw the migration of the LSEG's onsite datacenter to the cloud and headed up the implementation of its data delivery solution using application programming interfaces (APIs). The growing recognition of her ability to drive innovation and deliver customer-centric technologies has been rewarded by her presence in the winners' circle of this year's Women in Technology & Data Awards, receiving the technology innovator of the year (vendor) category for her efforts.

The LSEG cloud migration initiative became an enabler for developing and delivering the firm's technologies and services more efficiently and effectively. Leveraging the cloud's flexibility, Williamson designed and implemented the Client API Data Delivery solution for one of the firm's top-tier clients, which is now deployed as a standalone offering. According to the LSEG, the platform delivers data in a simplified and user-friendly format, drawing from a variety of sources across the FTSE Russell Index business. Its built-in features include APIs that can monitor user consumption and the issuing of smart alerts. The tracking functionality traces the processing of files in the system, provides user sign-on capabilities, and offers a unique interface for admin users. "Presenting a digital data delivery solution to our clients was a defining moment, not just for me but for the entire team," Williamson explains. "We were able to license our software development kit, enabling the solution further, and the project has shown that our collaboration across the board has been profound in propelling the way we can deliver information."

Throughout the project development stages, Williamson demonstrated her dedication to developing user-friendly and client-focused technologies. When migrating to the cloud, she successfully consolidated several multi-format desktop applications onto a single web-based platform, and developed a capability to allow for automated feedback from users. The data delivery solution also offers additional visuals and features including charts, analytics and Google-like search functionality.

As a young woman in the early stages of her career, Williamson has already showcased her ability to develop and deliver transformative technologies and manage largescale projects. And while men continue to dominate the technology realm, Williamson is determined to drive change by encouraging and guiding younger associates to speak up in crowded rooms and anchor their positions in the industry. She advises younger women, particularly across data and technology roles, to "stay curious, stay motivated, and always ask questions."

—JG

Kate Silverton and Regina Williamson

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Technology Leader of the Year (Vendor)

Natasha Shamis, Liquidnet

In 2002, Natasha Shamis was one of only seven women out of a total of 100 students to study computer science at Columbia University. "It was very lonely up on that stage during graduation," she recalls. Today, this problem still remains as women are vastly outnumbered by men in technology and data roles across the capital markets. Despite the odds, Shamis' ability to stand out and excel led to her appointment as global head of product at Liquidnet, helping to earn her the title of technology leader of the year (vendor) in this year's Women in Technology & Data Awards held in London on March 8.

When Shamis initially landed the role in 2014, she had one person reporting to her. Today, she has built a global team of 30 stretching across product managers, user experience (UX) designers and data analysts. Over time, she has appointed dedicated heads of product in Asia and Europe to oversee operations across the different jurisdictions and increase client engagement in the regions. Under her leadership, the team has focused on designing customer-centric technologies developed with a data-driven approach. As part of this vision, Shamis acquired and centralized the UX team, and implemented processes for measuring success of products and incorporating data into Liquidnet's technologies. She has led the charge in producing data-driven products and among her long list of achievements at the firm is convincing Seth Merrin, CEO of Liquidnet, to establish a dedicated data unit within the wider product development team. "The CEO supported that the focus had to be more on data science, which is where I saw the industry going," Shamis explains. "We had to be analyzing the way people use our products today in order to figure out how we build them tomorrow."

Since 2014, Shamis has pushed boundaries and exceeded expectations. In the first six months on the job she signed 100 new clients to Liquidnet's trading platform, and continues to lead the team in building out its capabilities, including its Virtual High Touch Suite and its most recent addition, Liquidnet Discovery. Following its acquisition of OTAS Technologies in May 2017, Shamis and the product team integrated OTAS' data analytics into Liquidnet Discovery, from which valuable insights can be extracted using artificial intelligence.

In the years to come, Shamis will continue to shape Liquidnet's technology vision by producing customized products, investing in innovative technologies such as artificial intelligence, executing strong leadership, and encouraging more women to enter the industry through incentives such as Liquidnet's Camp_Codea summer program.

—JG

Natasha Shamis and Kate Silverton

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Technology Leader of the Year (End-User)

Kirsten Achtelstetter, Man GLG

To the person on the street, Man Group is most associated with its sponsorship of the UK's Booker Prize. But for anyone even remotely associated with the capital markets, it's a powerhouse, and Man GLG is even more so. Charged with running the hedge fund group's technology is no small task, which is why Kirsten Achtelstetter, the firm's CTO, has been voted the technology leader of the year in the Women in Technology & Data Awards held in London on March 8.

As expected, Achtelstetter's career has a rich vein of technology running through it. A graduate of the University of Cambridge, with a Master's in computer science, she later gained a second Master's in management studies from the university's Judge Business School, during which time she worked as a summer analyst at Merrill Lynch. She later joined the firm in 2007, working as a business analyst focusing on software development. Stints as a consultant at RiskCare, a salesperson for the Marco Polo Network, and an account manager at Diligent Board Member Services followed from 2010 to mid-2013, before she joined the buy side at hedge fund Mandara Capital.

She stayed at the commodity derivatives shop for around three years, initially as a program manager, before shifting her focus to technology in her final year as acting head of technology, based in London. From there, Oak Capital, a proprietary commodities trading firm, hired her on as its head of technology and operations. There, she was responsible for building and running the firm's technology platform.

Achtelstetter joined Man GLG in 2017 as its head of technology strategic initiatives, and was promoted the following year to CTO. At Man GLG, she runs a team of 25 technologists and works closely with the business, to the extent that hers is effectively a front-office role. People familiar with her work at Man GLG point to her ability to understand how engineering teams can work together effectively, and her leading role in ensuring that staff not only collaborate, but are properly socialized within their environments as some of her primary strengths. To that end, she also promotes engagement within the wider business, having launched and run the popular "Bytes and Beer" internal meetup group at the firm, which hosts flash talks on current projects and emerging technologies, to which external speakers are often invited.

Achtelstetter is the second recipient of this award, after Wendy Redshaw—then-CIO for collaborative technology solutions at Deutsche Bank, who now works as the head of digital distribution at RBS—won this category in the inaugural Witad Awards last year.

—JR

Kirsten Achtelstetter and Kate Silverton

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Vendor Partnership or Alliance Professional of the Year

Marisol Collazo, DTCC

For Marisol Collazo, winner of this year's vendor partnership professional category in the annual Women in Technology & Data Awards, the path to technology was not one she had expected. Collazo is currently a managing director for business development and global head of strategic partnerships at the Depository Trust & Clearing Corp. (DTCC), although her background is not in technology—she holds a JD from New York Law School. "It was certainly not the deliberate path I charted by any means," she explains. "But what I did see is that there is a blurring between functions of technology and business, especially with emerging technology coming to the forefront. The path to getting into the technology space is now different, as it is determined by understanding industry trends. The value of having industry experience before starting to work with technology is knowing how to integrate technology into the financial workflow."

Collazo adds that she feels she brings a set of unique skills to the DTCC, which allow her to identify and focus on what needs to be experimented on in the space. It is this advice that Collazo would like to impart to women interested in working in financial technology. "Look at the trends in the industry and figure out what your unique perspective is," she advises. "These days, technology is not just coding because emerging solutions have driven the need for more diverse skillsets. For example, there's more demand for legal expertise and business skills because of the emergence of smart contracts. Carve your own path to technology and use the experiences you've had to provide a unique perspective."

Partnerships are essential to the DTCC's work as a clearing utility. Collazo points out that the organization relies on other parties involved in projects that are not the utility's core work, like developing and embracing emerging technologies such as blockchain and artificial intelligence.

In the past year, Collazo and the DTCC have identified a number of new partnerships, including with Symphony to integrate chat functions, and implementing Xceptor for additional data capabilities.

Collazo mentors women and people of color and assists them in navigating the DTCC landscape and is a board member of the nonprofit group, Women in Derivatives. She also actively supports increasing the number of people of color in the industry by working with the DTCC's Hispanic and Latino Business Professional Network.

—ED

Marisol Collazo and Kate Silverton

"Partnerships are essential to the DTCC's work as a clearing utility. Collazo points out that the organization relies on other parties involved in projects that are not the utility's core work, like developing and embracing emerging technologies like blockchain and artificial intelligence.

Vendor Professional of the Year (Data and Operations)

Tamsin Hobley, SIX

Tamsin Hobley, vendor professional of the year (data and operations) in this year's Women in Technology & Data Awards, has a mutually beneficial relationship with her employer, SIX, which provides capital markets firms with financial information and ancillary services.

Hobley is UK and Ireland head of sales for the Zurich-based firm, and has been with the company for about two decades, minus a five-year hiatus when she started her family. "I always come back to this work–life balance," she says. "I am ambitious, I am career-minded, and I want to be constantly challenged—I don't want to get bored in a role. SIX has always been able to fulfill that for me."

Hobley is the driver behind SIX's back-to-basics approach to client service, shifting attention from the added sell to the fundamentals of how data is created and consumed. "I have been instrumental in driving the business here in the UK," she says. "We've been in a growth trajectory; we've grown 7% year-on-year, adding key clients and really putting ourselves in their shoes, being flexible and entrepreneurial."

As her career matures, Hobley is taking specific actions to champion women in financial services, for example, through her involvement in the SIX Gender Diversity Network, although she has long been a proponent of diversity, leading a team that includes working mothers, various nationalities, and caregivers of elderly parents. "We focus on talent management, forward thinking, and hiring the right people for right roles," she says. "We have a very diverse team in the UK, but they're the right people for the right role, and then we recognize that talent going forward."

Hobley has benefited from mentor relationships and she also serves as a mentor—SIX has an official program—but she says a willingness to share knowledge is a core part of the company. "We have that culture and spirit, where if you want guidance and you want support, the best person to give you that is always available," she says.

From an industry-wide perspective, Hobley says financial services has "a long way to go" before reaching gender equality, citing the pay gap as an area with much room for improvement. She also points out that companies should better prioritize flexibility, and not just for parents. "I think people need to be able to take a career break and not have their career affected by that," she says, something she recognizes is "difficult for companies to do, but that is what's required. There's no magic wand. It's going to take time and it's the companies that need to make the change."

—JH

Tamsin Hobley and Kate Silverton

> Hobley is the driver behind SIX's back-to-basics approach to client service, shifting attention from the added sell to the fundamentals of how data is created and consumed.

Vendor Professional of the Year (Trading & Risk)

Susan Estes, OpenDoor Securities

Susan Estes, founder of Jersey City-based bond trading platform OpenDoor Securities, and recipient of the award for professional of the year (trading & risk), occupies a somewhat unique position in the financial services industry: She is CEO and president of one of the few organizations majority owned and operated by women. "We didn't start out looking for a female lead investor but, once secured, as we've moved forward, we've tried to maintain that bias," she explains. "Every employee has an equity stake in the business, and we have a very diverse pool of employees with 52% women and minorities. The split is also equitable as you move into management. Including myself, three senior managers are women."

The business, launched in April 2017 and by most measures still a startup, appears to be going places: To date it has facilitated over $1.4 trillion in order volume and over $27 billion in matched trades, in addition to securing $32.5 million in Angel and Series-A funding. The platform has seen a 436% increase in average daily order volume since new functionality was rolled out in April 2018, with matched volumes rising 403% over the same period.

Notwithstanding those impressive numbers, Estes remains underwhelmed by the slow pace of change across the industry, especially when it comes to the numbers of women in the boardroom. "Statistics show that women are still facing some pretty significant hurdles when you get to the C-suite level," she says. "In 2010, just 16% of women held C-suite positions; today it is 19%."

A 3% rise over the best part of a decade is hardly world-changing. "At that pace, it will take another 62 years before there is an equal division of men and women in C-suite positions," Estes explains. "That will be 2079 and my daughter will be 87. To me that is unacceptable."

On a more sanguine note, Estes explains that OpenDoor has big plans for 2019: It is eyeing additional products and geographic locations, even though it still has work to do in its core business of off-the-run Treasurys and Treasury Inflation-Protected Securities. "Changing market structure is not easy—it takes time and considerable patience," she says. "Session-based auctions were a critical, incremental step necessary to allow market participants to become familiar with the new market structure and unique protocols OpenDoor introduced in April 2017."

According to Estes, now that OpenDoor is well-established and the challenges posed by thin liquidity in off-the-run Treasurys are better understood, the firm is set to introduce continuous auctions, offering participants immediacy of execution for transferring duration risk throughout the day.

—VBA

"The business, launched in April 2017 and by most measures still a startup, appears to be going places: To date it has facilitated over $1.4 trillion in order volume and over $27 billion in matched trades, in addition to securing $32.5 million in Angel and Series-A funding.

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2019 events

12 April, London
Sell-Side Technology Awards 2019

21 May, New York
North American Financial Information Summit

21 May, New York
Inside Market Data & Inside Reference Data Awards 2019

11-12 June, Hong Kong
Asia Pacific Financial Information Conference

2 July, London
waters EUROPE

4 July, Tokyo
Tokyo Financial Information & Technology Summit

11 July, New York
waters Rankings 2019

11 September, London
European Financial Information Summit

22 October, Singapore
waters ASIA

1 November, London
Buy-Side Technology Awards 2019

3 December, New York
American Financial Technology Awards 2019

3 December, New York
waters USA

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WatersTechnology's Woman of the Year

Beatriz Martín, UBS

Sometimes when you're conducting an interview, a response to a seemingly banal question takes you by surprise and captures a certain quality of the interviewee that you'd found hard to define until that moment. That happened recently when talking with Beatriz Martín, UK CEO and global COO of UBS Investment Bank, about her win in this year's Women in Technology & Data Awards. "Do you ever get to pick your daughter up from school?" *WatersTechnology* asked in its final question to her, to which she responded immediately: "Yes, of course I do. I also get to go to the shows (school plays)," she explained, illustrating just how far this industry has come in recent years with respect to flexibility and supporting employees' work–life balance. "Last year we had a two-day executive committee meeting and one of the days coincided with my daughter's Christmas show," she continued. "I made arrangements with my team to make sure that I could go to the show on the morning of the meeting. This is 2019 and sometimes I would like to be present at important events for her and also for me. Juggling my roles at work and my role as a parent comes down to fiercely protecting the choices I have to make and what I prioritize at any given moment to get the right balance—something all working parents, men and women, do every day. It's also my responsibility to lead by example so that colleagues, male or female, feel they can do the same."

The significance of a chief executive—especially one representing one of the industry's most prominent investment banks—speaking so candidly and emphatically about the importance of family life and maintaining a healthy work–life balance should not be underestimated. UBS, with Martín at the helm, might well be blazing a trail that ultimately all capital markets firms come to follow at some point in the future.

According to Martín, recipient of the best technology executive (sell side) category at last year's American Financial Technology Awards, UBS has been on a decade-long "journey" to increase the ratio of women in senior management roles to one third. "We have put a lot of thought into our many diversity and inclusion initiatives, which includes gender diversity," she explains. "As an organization, we have thought about how to recruit and also how to place women in strategic positions, and that is definitely not by coincidence. We have done a lot of work on it and it has improved, but we are by no means done."

We could wax lyrical about Martín's achievements and her plans for UBS, but what is more compelling in this context is her candor and open-mindedness with respect to gender equality and driving the work-life agenda, a stance that is as rare as it is refreshing.

—VBA

Beatriz Martín and Kate Silverton

> UBS, with Martín at the helm, might well be blazing a trail that ultimately all capital markets firms come to follow at some point in the future.

Trailblazer (Lifetime Achievement) Award

Catherine Bessant, Bank of America

When *WatersTechnology* first wrote about Catherine Bessant in a 2011 profile interview, we told the story of an English major who "sent shockwaves through Wall Street" when then-Bank of America CEO Brian Moynihan made her global technology and operations executive. Eight years on, Bessant is still making waves, both at the bank, and at the highest levels of government.

Indeed, this "trailblazer" award is aptly named on several levels. Bessant has been at the forefront of technology leadership for some time, starting when female tech executives at major banks were few and far between. Since then, she has continued her leadership role, not only engaging with, but implementing, emerging technologies—Bank of America's artificial intelligence (AI)-powered assistant Erica, was launched under her watch, while on the retail side, she has overseen the integration of payments technology such as Zelle with the bank's mobile app. On the infrastructure front, she has spearheaded the firm's rationalization program, with her staff retiring over 18,000 applications, consolidating 65 datacenters to 16 by year-end, and reducing expenses by 26% since 2013.

Critically, however, Bessant has also been an important voice in the debate over the future of AI, as the industry begins to understand the impact this technology will have. In 2018, she initiated the Council on the Responsible Use of AI, led by the Harvard Kennedy School, which led to her receiving an invitation to the White House in May 2018 from the Trump Administration to participate in the summit on AI for American Industry.

Outside of technology, she has been a strong advocate for diversity within Bank of America, serving as executive sponsor for the firm's LGBT Executive Council, as well as the LGBT Pride Global Ally Program. She was the bank's figurehead for its famed opposition to North Carolina's House Bill 2, joining forces with other tech companies to force a repeal of the "Bathroom Bill." She has also been a key sponsor for the bank's initiatives around promoting female engagement with technology. At the heart of her success, she says, particularly as a woman in this field, is personal honesty and belief.

"The world has a lot of yardsticks, but there's only one that matters, and that's your internal yardstick," she says. "Realizing when you look eye-to-eye at yourself in the mirror, you're the only one who really knows how you measure up—it will provide that confidence, that self-belief allowing you to take risks. It will allow you to be impactful; it will cause you to reach your full potential; and it will make your relationships deeper, because you won't be motivated to find that confidence in other people that you can't find in yourself."

—*JR*

Catherine Bessant

"Critically, Bessant has also been an important voice in the debate over the future of AI, as the industry begins to understand the impact this technology will have.

Academia Digs Into Data Through Industry Partnerships

Firms are pushing their university programs past the traditional internship structure, embedding students and researchers to work on current use cases to deliver solutions to real-life problems. Jamie Hyman reports.

Technology is radically changing the way we learn.

There is evidence that the rapid evolution of how humans interact with technology is rewiring our brains. In 2015, Microsoft researchers in Canada surveyed 2,000 participants and studied the brain activity of 112 others using electroencephalograms. "Tech adoption and social media usage are training consumers to become better at processing and encoding information through short bursts of high attention," the report said, and researchers also found humans are improving at focusing on more things at once, concluding that human attention is becoming more discerning and demanding of quality content to consume.

Educators are adapting their methodologies to adjust to evolving cognitive behaviors by deploying new technological tools designed to teach, taking advantage of new technology that fosters collaboration, makes geography irrelevant, and offers powerful visual and immersive opportunities to absorb information.

It follows, then, that the way knowledge is passed on within financial services is also undergoing a transformation. Firms and universities are entering creative, mutually beneficial partnerships that make traditional internships look positively quaint, building programs that embed students into firms to solve tricky problems.

NEET Idea

The Financial Risk Group (FRG), a risk management consultancy, runs a program that was relatively pioneering when it launched in 2009.

"The concept isn't exactly new," says FRG managing partner John Bell. "Folks have been apprentices for hundreds of years, but in the tech space, it seemed like a fairly novel concept for some reason. We didn't have a lot to draw on back then."

New Employee Excellence Training (NEET) was created because FRG "had a heck of a time finding anybody to hire," Bell says. Based in Cary, North Carolina, FRG is not located in or near any of the major global financial centers, but it did have one valuable resource: a location adjacent to what's known as the Research Triangle, anchored by Duke University, University of North Carolina, and North Carolina State University.

"We could not grow this business without NEET," Bell says. "That is the major benefit for us. We've found we cannot hire without this program—qualified folks just don't exist at the numbers that we need to grow our business."

FRG runs two or three classes a year and they are small, with around three to five students. NEET has expanded to all of FRG's locations, so over the past decade, it has graduated 42 students across the US, Canada and Malaysia, and it now partners with 20 universities.

"The program is divided into two sections, one focused on technology and different tools students are going to need during implementation or model development, and the second is more about the domain, risk expertise—both in market and credit—things you can't get in school, for the most part," Bell says, adding that program participants earn certifications in those areas, such as FRMs or CFAs, depending on the candidate.

NEET training lasts about one year, and kicks off with a 60-day "boot camp" designed to put students through their paces quickly, "mostly on the technical side, although there are some reading assignments on the domain," Bell says. During boot camp, students take certification tests and once they pass, "they're out of boot camp and into the advanced training piece," which takes another three to four months. "This is where they take their basic technical skills that they've learned, we enhance it with some other courses and then really start injecting the domain—What is credit risk? Why is it important?—trying to apply what

"We had a really interesting project done where a student actually started profiling our reference data and as a side effect, was able to self-identify the types of data through pairing and clustering. After that, he would run the data quality algorithm against the historical datasets."
Gary Goldberg, Mizuho Securities EMEA

they've learned in the technology part to real business problems," he says.

Students are assigned mentors, and this phase is where it gets interesting, because candidates start work on current use-case problems. NEET also tosses in what Bell calls a little "light hazing."

"Last week, we dropped in on a Friday at 10 o'clock and said, 'Okay, here's an ask, and you have to deliver it in front of everyone at 2 o'clock.' They have a short time window to research, typically without a lot of guidance—we may give them a little bit of data. Usually, we rip those out of things we've been asked to do by our clients, so they're fairly well-grounded in real risk-related challenges, not pulled out of the sky," Bell says. During this phase, students also work on soft skills such as technical writing and public speaking.

To get to that point takes about six months, and candidates who make it are deemed ready to move onto project work alongside their mentors on smaller tasks. Bell says they try to keep it about 60% learning, 40% project work over the next few months, "until they ramp up to speed. The goal over that next six months is to have them ready to join a team full time." Some classes stay internal at FRG while others are embedded directly with FRG clients.

Inside the Vault

And of course, some end users run their own, similar programs, such as Mizuho Bank, which for the past three years, has partnered with universities to bring data science students into the bank to collaborate on data projects. "They get access to the datasets in a controlled way; we get access to new talent and new and innovative ideas," says Gary Goldberg, chief data officer for Mizuho Securities EMEA, who adds that the bank is kicking off a new set of projects this year.

An early, successful project was the development of an algorithm to identify data quality issues, with the aim to automate and reduce the time spent cleansing data. "We had a really interesting project done where a student actually started profiling our reference data and as a side effect, was able to self-identify the types of data through pairing and clustering. After that, he would run the data quality algorithm against the historic datasets," Goldberg says.

Normally, data quality checks are done on the basis of mandatory attributes—for example, if in instrument requires a specific identifier that is missing, then that's an error. "The limitation with rules-based data quality checks is you're only ever going to capture anomalies based on rules that you have identified. What we're doing with our analytics approach is different. We use an algorithm to look at historical time series. It then builds up a pattern of normality so when a data point varies from that normality, it's flagged as an exception. We can rate the probability of an exception being valid based on the profiles of multiple attributes," he says. "Those [data quality issues] get flagged up to the data maintenance team to be managed proactively."

Mizuho's university partnership program is attracting interest from around the bank.

"That work has also led to interest from other parts of the company. People have heard about these data experiments and want to understand more about them. Data's become cool," Goldberg says.

The projects vary, and he says the bank is cognizant of the balance between keeping proprietary information locked down while keeping the program engaging.

"When we're dealing with university students, we have to be careful about security," Goldberg says. "We're not going to give students access to confidential information, but we offer projects that deliver real value that gain the interest of students."

Most of FRG's clients are large financial institutions, energy companies and commodity firms. A NEET team is currently working to implement a mortgage model on the basis of a set of quantitative inputs. The client provides spreadsheets and some documentation, which the students scour to "figure out what they want to do and then implement that, which essentially means code it up in whatever language or technology the client is using, and then go through the process of testing that, vetting it and documenting it so it gets rolled out," Bell says.

Another recent project was to add some functionality to a user interface, which the client needed for regulatory reasons, and so students interviewed end users and assisted in writing the back end, but were not involved with actually building the functionality. "That involves everything from figuring out how the database should work, any of the analytics involved and then of course, returning a report or some type of feedback to the user," he says.

NEET candidates have tackled client performance issues by taking a deep dive into a set of models to diagnose issues and return suggestions on how to improve. Students also helped a NEET client with a slow-running calculator by looking at the actual code and making a list of ideas for improvement, which were presented to the client for approval. "They're currently working on executing and implementing those changes," Bell says.

Rhythm of Research

These partnerships are not limited to undergrads. Refinitiv Labs—the innovation division within Refinitiv—is partnering with universities to develop research that combines the data giant's content and technology with the schools' research interests. It's been sponsoring a postdoc and his supervisor at the Alan Turing Institute for about a year as they look into trade anomalies and sentiment propagation.

> "The concept isn't exactly new. Folks have been apprentices for hundreds of years, but in the tech space, it seemed like a fairly novel concept for some reason. We didn't have a lot to draw on back then."
> **John Bell, FRG**

"We've discovered a problem area, we've funded them to do that research and we've supplied our data for them to do that research on real financial use-cases," says Refinitiv Labs director Geoffrey Horrell, adding that it has a similar partnership with Imperial College London and it sponsors a senior lecturer at Bristol University. "We're sponsoring that post and encouraging that department to use our data and giving them access to our information and to us, if their students or researchers want to understand more about how to apply their work to real financial industry problems."

Horrell says that although the firm is open to expanding and increasing partnerships, "we're very careful to select the right partner and the right project. It's quite intensive. You really need to be invested and involved. We're very open to new partnerships and new work, but it's sort of on a case-by-case basis." It's taken Refinitiv about three years to establish its current slate of partnerships, because of "the timing and cycle of how university departments work. They have to publish research papers, they have to bring in Master's students. They have their own rhythm. So we've had to line up the right kind of projects with the right kind of team. It's taken us a couple of years to get a good working rhythm going."

Nasdaq has another twist on an academic partnership, through a collaboration with MIT that provides the exchange with access to university research. "We also have been able to embed our projects in classes," says Brad Peterson, CTO and CIO of Nasdaq, explaining that it runs internship classes twice a year; then if it hires those interns, they become mentors for academic partnership projects "and we run them like a product team."

The undergrads act as engineers, working on a real build, Peterson says. "And they're dealing with MIT alums, usually, so they speak the same language and they're living out of their apartment or dorm so they don't have to move for the summer. I think we've found a good rhythm out there." He says they've also expanded the partnership to Stanford.

Beyond Brainpower

Recruitment was the spark behind FRG's program, but the partnership has resulted in other benefits, as well. "We seed graduates out into our own clients, so there's this built-in FRG bias as our NEET folks move up the corporate ladder. We hope they fondly remember their days at FRG and then call us when they need help," Bell says. "I have folks now who are fairly senior, leading teams, who went through our NEET program."

"We want to bring talent from these top schools into the company. We want to explore new areas, push the boundaries, and discover new things. It helps us create new intellectual property. Creating defendable intellectual property is very valuable when you're trying to grow in this knowledge business age."
Geoffrey Horrell, Refinitiv Labs

The positive impression is reflected internally, as Bell says NEET candidates who come to work for FRG tend to stick around. "When we started NEET, I figured we'd get three years, tops, out of them. A lot of them have had 10-year anniversaries already. There is a very low turnover rate for folks who have gone through the program."

One notable alum is the inaugural NEET graduate, who still works at FRG. "Our first NEET class was one person," Bell says, adding that the candidate actually helped build the program material.

"[NEET] gives us this nice pipeline of fresh ideas and thoughts constantly coming into the company," he says, and the candidates are not limited to finance students, specifically mentioning a history major who graduated the program, was hired by a client and is still there. "It's a testament to the program, when we can take someone who really had no financial background in school and was able to be very successful."

Recruitment for NEET is deliberate and treated almost like a professional sports draft, Bell says, as professors recommend promising students—usually sophomores and juniors, but sometimes as young as high school—and then FRG maintains a database and tracks the potential candidates. "We also leverage the NEET kids as they come in," Bell says. "It's kind of this perpetual engine—as students come in, then they're perfectly situated to reach back out to their professors and tell them about the program."

Refinitiv's Horrell also sees building relationships with universities as a method to increase hiring power. "We want to bring talent from these top schools into the company. We want to explore new areas, push the boundaries, and discover new things. It helps us create new intellectual property. Creating defendable intellectual property is very valuable when you're trying to grow in this knowledge business age," he says.

University partnerships bring marketing and promotional benefits, as well. Horrell says Refinitiv provides its research to other university partners. "If they produce research papers that use our content, we point our customers to it," he says, adding that academics are often happy to speak to Refinitiv clients about their research. "Our customers like that independent perspective on some of these problems."

NEET has been so successful that FRG is expanding the program to its sales force. It is also cost-effective, as clients who want a class embedded in their firms pay FRG to train and facilitate. "We make money on that, because over the second half, we start billing the client for the project time. That [second six months] margin is what pays for the first six months for us," Bell says.

Horrell points out that it's not just the partners that gain from teaming up—projects that share data with academics have the power to elevate the entire industry. Currently, he says, a lot of the game-changing, published research on machine learning and artificial intelligence (AI) does not use financial data. "I think that if the financial markets want to really benefit from the financial research being done at these institutions, we need to open up our datasets to be used by academics. I really think that machine-learning models or AI models are only as good as the data they use. We really want to open up access to the data we have at Refinitiv to researchers so that the models that come out can work for the financial community."

Google, for example, could hypothetically publish a "fantastic" deep-learning model based on data from Gmail or its open news content, "but if you train that same model on financial news or financial research, it will be much more accurate when applied in our market," Horrell says.

He thinks it is a goal for the industry to make datasets available so research models are useful to financial services. "That's where I see opportunities for us to do more," he says. wt

State Street Aims to Bolster ESG Offering with Latest Partnership

State Street is teaming up with Harvard professor George Serafeim to create solutions that help institutional investors find ESG materiality. By Anthony Malakian


Harvard Business School

As institutional investors are increasingly looking to incorporate environmental, social and governance (ESG) factors into their investment processes, State Street is expanding its suite of services by partnering with Harvard Business School professor George Serafeim, whose work on the subject of ESG investing has been cited in numerous academic journals.

He will work with researchers at State Street Associates (SSA), the bank's academic research arm that works to provide investment insights to chief investment officers, portfolio managers and analysts at pension funds, mutual funds, insurance firms, sovereign wealth funds and other institutional investors.

SSA, which was founded in 1999 and is housed in State Street Global Exchange, has partnered with professors from various other institutions to tackle things like investor behavior, inflation, performance measurement, and other market challenges (*see box*). This is the first time the group will address ESG, says Will Kinlaw, head of State Street Associates.

"As this theme has emerged, we've been watching it very closely as a firm," Kinlaw says. "We felt that this would be an area where we could benefit from a real high-profile academic like George, who has done very rigorous work in this space. With George, what really stuck out was this focus on the link between ESG and performance—the materiality of ESG factors to performance. That's been the focus of his research and it's very impactful."

Through the pairing, SSA will release white papers to provide actionable insights that are drawn from anonymized data collected by State Street Corp. They will also look to create "dashboards and other analytics tools that would be updated in real time and would help clients understand how different ESG factors are evolving or how markets are trading around different ESG factors," Kinlaw says.

Serafeim was unavailable for comment.

The Expanding ESG Landscape

According to consultancy Opimas, total spending on ESG data, including ESG content and indices, will hit $745 million by 2020, up from $505 million in 2018. This growth is indicative of the increasing demand by institutional investors to better understand materiality between ESG adherence and a company's financial performance.

While there are numerous academic papers that state that firms with superior performance on material sustainability issues outperform firms with inferior performance on these issues, from a practical, trading perspective, firms are still navigating this sprawling field.

"There's a ton of research that needs to be done in this space. The relationship between ESG factors and performance is complicated because it varies a lot depending on the type of company, the sector, the [time] horizon, and return impacts versus risk impacts."
Will Kinlaw, State Street Associates

Carmine De Franco, head of fundamental research at Ossiam, an affiliate of Natixis Investment Managers, told *WatersTechnology*'s sibling publication *Risk.net* that understanding materiality is not as simple as firms that are strong on ESG will yield strong performance.

"Many people say, maybe too optimistically, that a company that ranks highly on ESG measures brings outperformance. As a responsible citizen, I would like to believe it. But in reality, it's more complicated," De Franco said.

And Asha Mehta, lead portfolio manager and director of responsible investing at Acadian Asset Management, noted that the industry—and Acadian, itself—is still working toward developing a common framework to better understand ESG materiality. "It's problematic not to have [a common framework] because when we talk risk we're talking about different things. And when allocators are evaluating managers, there's no consistency," he said.

Timothy Smith, director of ESG shareowner engagement at Walden Asset Management, tells *WatersTechnology* that ESG investors—as well as the subset known as socially responsible investors (SRIs)—need all the standard financial information a conventional investor would need to make stock selections. But they also need to gather this divergent sea of ESG data from numerous sources. Some of it is received via basic public information and other datasets are specialized reports and indices from data giants like MSCI, Refinitiv and Bloomberg, and specialists such as Trucost, Sustainalytics, RepRisk, Four Twenty Seven, and CDP. They also have to dig up specific sources of information such as political spending, and at times they have to file a Freedom of Information Act request.

"So while there is an explosion in SRI investing, there is growth in the various information sources as well," Smith says, which makes finding materiality even trickier.

To that point, SSA's Kinslaw says incorporating ESG factors into the investment management process is complicated because measuring the various ESG factors can be challenging: Not all datasets agree, and there isn't a consensus on how and what should be measured, as Mehta noted. Even when a portfolio manager finds a measurement they believe in, how they incorporate that into an investment process raises additional questions as to how it should be incorporated into the wider portfolio.

"There's a ton of research that needs to be done in this space," Kinlaw says. "The relationship between ESG factors and performance is complicated because it varies a lot depending on the type of company, the sector, the [time] horizon, and return impacts versus risk impacts—some indicators are more about if there's poor governance that might result in better returns for some period of time, but your exposure to tail risk [increases] and your long-term prospects are dimmer. It's not straightforward and it's an area that's ripe for fact-based, data-driven research and analysis." wt

State Street Associates' Academic Partnerships

- Mark Kritzman, MIT – asset allocation and risk
- Ken Froot, Harvard Emeritus – investor behavior
- Ronnie Sadka, Boston College – media sentiment and financial markets
- Alberto Cavallo, Harvard – inflation and economics
- Roberto Rigobon, MIT – inflation and economics
- George Serafeim, Harvard – ESG investing
- Martijn Cremers, Notre Dame – performance measurement

Storms in the Cloud

While firms are still grappling with how best to use the public cloud, for most the migration is inevitable—and, certainly, many have already begun this process. These projects, though, are fraught with challenges. Anthony Malakian speaks with some early public cloud adopters to find out some of the lessons they've learned along the way.

Chicago-based futures trading software provider Trading Technologies (TT) had spent over two decades building out its flagship X_Trader platform. So, when the vendor decided to completely change course and phase out the monolith, hard-install product in favor of a software-as-a-service offering built using a cloud architecture, it surprised some, including people within TT itself.

By 2012, when the company made this decision to change everything, cloud computing was hardly new—at this point, most in the capital markets had, at a minimum, begun experimenting with private cloud, and some of the larger sell-side firms were kicking the tires on hybrid offerings by partnering with public cloud providers like Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP) and IBM Cloud. The decision to make such a bold move and put the company's lifeblood on the cloud, though, was—to say the least—unique.

And to be sure, TT had to learn some lessons along the way.

"Being the first-mover, in this case, can have a downside because you become so invested and have so much inertia in one way of building something—and a commitment to one tech stack or one platform—that later entrants can do what took you 80 months and 100 people by clicking a button because Amazon automated all of it," says Rick Lane, the CEO of Trading Technologies.

In those early days, it was also more than just hours lost—sometimes it was dollars and cents. Lane recalls a time when the vendor made a small change to the way it stored tick data in one of its databases. He says it was a relatively innocuous change—"no one really though much about it"—but the next month TT received its storage bill and noticed it was $50,000 higher than the previous month. It turns out that small change cost the company a lot of spare change.

"Anytime we're going to spend $50,000, we scrutinize it a lot," he says. "This was something that slipped through the cracks, as simple as could be, and it was another reminder that

"You can do the cloud wrong; it's not like you just suddenly press one button and you're in the cloud. You can misconfigure the cloud instances and create massive vulnerabilities, so you need to have proper governance when you move there and be worried about security, just as much as if it was in your own private datacenter."
Bill Murphy, Blackstone Group

you have to make sure you understand the impact of turning on these incredibly easy-to-consume services and that you don't forget about them. When you turn them on, you have to make sure they're tagged and associated in the right way so that when someone comes through and tries to audit everything, they know whose spend belongs to which team, and that sort of thing."

While tools have since entered the market to help firms more accurately keep track of cloud usage and spending, there are a litany of other obstacles that firms need to manage when moving to a public cloud.

This article will not discuss the benefits of the cloud—that's a story that has been well documented already and with each passing day, more and more firms are looking at new ways of using the cloud and cloud-based tools (*See Chart 1*).

Rather, this story is about some of the pitfalls of using the public cloud. Of course, there are security concerns—this, too, has been well documented—but this is also an aspect that has been a bit overblown. Yes, firms can create massive vulnerabilities if they cut corners when architecting for the cloud, but the big four public cloud providers also have the resources to combat new threats that Wall Street firms simply do not have. Beyond security—which will still be covered—early adopters of the public cloud have also had to learn lessons around migration strategy and architecting, cost management, how to properly deploy open-source tools and, crucially, how to change the culture of the firm while trying to attract new talent with unique skillsets. And all of these considerations combined will help to inform a firm which of the public cloud providers to use, though increasingly, firms are using more than just one cloud provider (*See Chart 2*).

TT is far from alone in moving to the cloud—in fact, it represents one of the early adopters in this great migration. Here are some of the lessons that have been learned along the way by banks, buy-side firms, and vendors, alike.

The Process

The Blackstone Group is one of the largest private equity firms in the world. As such, it is in a unique position as both a company that builds its own technology solutions for internal use, and one that invests in cutting-edge companies—more than 95 of them, with $82 billion in combined annual revenue, according to the firm.

In the summer of 2018, Blackstone took chief information officers (CIOs) from its portfolio companies out to Silicon Valley in order to conduct back-to-back meetings with Amazon, Microsoft and Google. Bill Murphy, Blackstone's CTO, says that about two years ago, the CIOs' general attitude toward the public cloud was that it was an interesting proposition, but it wasn't a near-term inevitability for them.

This time, he says, the attitudes had shifted and moving some parts of their operations to the public cloud was a short-term priority for almost all of the CIOs who went on the trip.

According to a recent report produced by consultancy Tabb Group, the majority of firms across the buy side, sell side and exchange sector plan to increase spending on cloud in 2019. (*See Chart 2*) At the annual Waters USA event, which was held in early December 2018 in Manhattan, delegates in the audience—of which there were over 200—were asked how much of their workloads are in the cloud versus on premise: 54% said that between 0% and 25% of workloads were in the cloud, 23% said between 25% and 50%, 12% said between 50% and 75%, and 12% said between 75% and 100%.

Murphy says that, for Blackstone specifically, it falls into that 25% to 50% bucket. The concept of "flipping a switch and the cloud magically appears" is a fallacy, he says. He doesn't view the cloud as a destination; rather, it is the cloud coupled with good governance that is the destination, which often gets overlooked.

"You can do the cloud wrong; it's not like you just suddenly press one button and you're in the cloud. You can misconfigure the cloud instances and create massive vulnerabilities, so you need to have proper governance when you move there and be worried about security, just as much as if it was in your own private datacenter. Hopefully, it will be a little easier because some of the tooling is built in for you," Murphy says. "It's just a workshop and you can use tools wrong. You can use a saw to make a beautiful piece of furniture—or you could cut your arm off. You have to be careful with how you're doing it."

What further complicates matters is the sheer scale of updates released on a yearly basis by the big public cloud providers. Blackstone uses AWS, Azure and GCP for various aspects of its organization, and Murphy doesn't have anything bad to say about any of them—they each have their strengths and weaknesses. But when using a multi-cloud model, it's important to keep up with the latest updates, which poses unique challenges.

"It's never been harder to stay abreast of everything that's happening as it relates to the technology world. For the CIO or CTO, I think the job is more complicated than it's ever been because AWS, Google, and Microsoft are each releasing probably 1,000 new features each year. Just reading the details of 1,000 new features every year is a challenge," Murphy says.

It is for this reason that Blackstone has invested in Cloudreach, a cloud consulting firm, from which it hopes to have some of these questions answered. "There's a dearth of that expertise in the market, so staying up on everything that they're doing innovation-wise is a challenge and you're probably going to leave some innovations on the floor that you could have picked up just because of awareness. So if anyone has great awareness strategies, we're all ears because we want to make sure that we're taking advantage of the latest [breakthroughs]," he says.

Compare and Contrast

While New York-based derivatives software vendor Numerix has established itself in the risk analytics space, it has also slowly been expanding its field of expertise of late. The firm had been playing around with the cloud for several years—using Azure for some internal workloads—but about two years ago it started to utilize the public cloud for production deployments and for its managed services. For this latest endeavor, it switched over to AWS, though it still does support Azure for specific customer requests.

As mentioned before, expense is always a concern. Benjamin Meyvin, senior vice president of managed services for Numerix, says that, by and large, the prices of Azure and AWS are very close. Beyond cost, there are many other aspects that led Numerix to select AWS for its managed services business.

At the top of the list was disaster recovery and compliance. The vendor, for example, has a significant presence in Singapore. When Numerix was making its decision, Azure had only one datacenter in the Southeast Asian city-state—AWS had three.

Also, Meyvin says he felt that from an operational perspective, AWS was stronger. With AWS, he says, if you have a question, the online documentation "is fool-proof; it's correct. If you follow the instructions, you get the desired outcome." He says that with Azure, often its documentation would be "contradictory" and he would have to go to online forums and blogs to piece together the information he needed.

Additionally, there's the concept of dedicated instances: For example, if Numerix is running workloads on a particular virtual machine, no other companies/users are allowed to use the underlying server at the same time, which a company or local jurisdiction might require. Meyvin says with AWS, all virtual machines provide this option for an added price; with Azure, it's not fully supported and for instances where it is, the cost can be prohibitive.

But where Azure shines is when it comes to contract flexibility. For most companies—i.e., companies the size of Numerix and not National Security Agency contractors—AWS takes no liability and essentially offers a take-it-or-leave-it contract, Meyvin says. Microsoft, on the other hand, will sit down and craft an agreement that works for both parties and offers things like license mobility and the ability to bring a firm's own licenses over to the cloud.

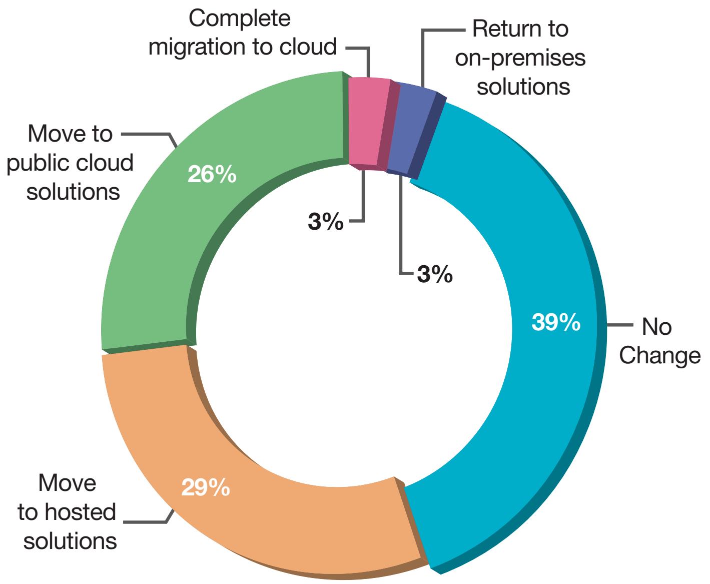
"At the end of the day, it becomes this balancing act of commercial considerations, legal considerations and technical capabilities—and I guess that's why both companies are so successful," he says.

Truth in Numbers

Perhaps the top challenges when converting to a public cloud model are cultural and philosophical. Meyvin notes that today there are good tools to measure cloud usage and spend. Where the surprises come, though, is in instances of treating a cloud architecture like a legacy IT architecture.

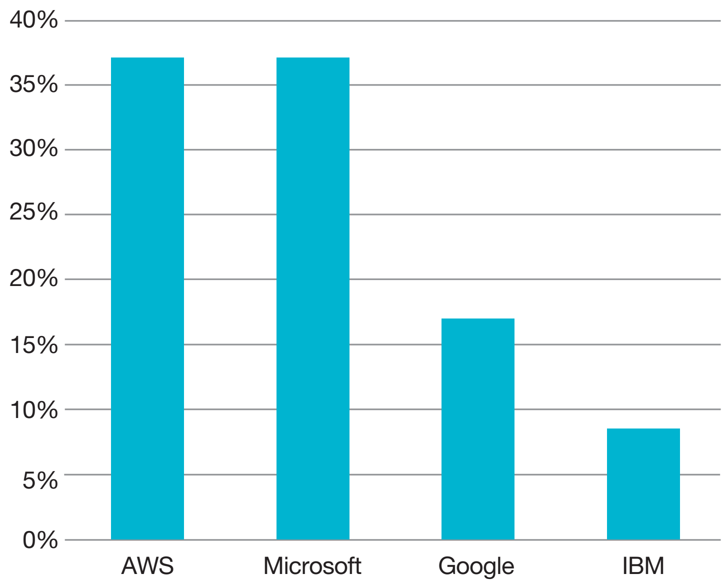
When the business and technical communities start talking about the number of cores they will need or

Chart 1: Workloads Moving to Public Cloud



Source: Tabb Group

Chart 2: Which Cloud Vendor Do You Currently Use?



Source: Tabb Group
Note: Respondents were asked to select all that applied; top four responses charted.

the size of memory, red flags can pop up because these metrics tend not to be sufficient to produce any kind of sensible estimate of future costs.

"When you reach out to Microsoft or AWS and ask for any kind of estimate, if you call up and say that you need 500 cores and ask how much that will cost, they directly answer the question—they will tell you, truthfully, how much 500 cores are, but this is like going into Best Buy and buying a motherboard and nothing else. So 500 cores, $500—but then you need everything else and that's another $5,000," Meyvin says.

Meyvin is personally responsible for cloud spend in his group. The way he has tried to control cost is through automation and proper governance, but it took some trial and error to figure out the best model.

Originally, Numerix gave users the ability to request cloud resources—such as servers and tools—and then it was up to that user to release those resources once they were done using it, which rarely happened. After the self-service model failed, Numerix created a schedule where cloud resources were made available for eight hours per day, four days per week. That didn't work, because what was good timing for New York was inconvenient for Singapore, and what worked for Singapore didn't work for London, and so on and so forth.

Numerix has since settled on a model where authorized users—it's not a free-for-all—can request resources and essentially get a two-hour "lease" on that server or set of servers. The way it works is the users request cloud resources via an automated email system. If the user forgets to shut down the environment, that set of resources will automatically shut itself down after the two-hour lease expires. Or, the authorized user can send a follow-up email requesting another two-hour block, which will automatically reset the timer.

"That's when I finally got myself out of the business of having to argue with my colleagues over how much they can have; it's all self-service and audited—I get a daily report on who is using what and for how long in terms of hours and dollars. I don't need to do anything at all," Meyvin says. "This is crucial: There is an organizational cultural shift when it comes to cloud technologies, because at first you go through this space where people don't know much about the cloud. Then, all of a sudden, everyone in the organization thinks that they're a cloud expert because they've had many meetings and have seen many PowerPoint presentations. Once the gates are open, the number of requests for cloud resources that you begin to receive is staggering. All of a sudden, all of those constraints that existed somehow they don't exist any longer. The more people taste it, the more they like it."

At Scale

One of the more interesting cloud programs being undertaken in the financial markets is taking place at Bank of America (BofA). Via a program originally called Project Greenfield—now Bank of America Cloud—the financial services behemoth aims to host 80% of its global compute workload in the cloud by the end of 2019, and to achieve a 20:1 compression ratio in hosting. The project, which began in earnest two years ago—though the seeds were planted in 2013—looks to significantly lessen the bank's footprint of more than 60,000 physical machines in 36 datacenters.

To achieve this, it has to move at least 3,000 operating systems per month to the new environment—an environment that is different from the traditional public cloud model that is mentioned above because it is technically a private cloud, but given the institution's size and scale, it mimics the benefits of a public cloud, and it should also be noted that it does utilize Azure to run a few applications in "a controlled public cloud environment where it makes sense due to business requests," says BofA's CTO, Howard Boville.

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waterstechnology.com/4232971

With a workforce of 200 employees, the bank has seen months where 8,000 operating systems were migrated to the cloud. Additionally, with over two-thirds of earmarked systems migrated, there are between 12,000 and 14,000 systems in a planning or execution phase for migration at any moment—it's an extraordinarily large undertaking.

As might be expected, Boville points to the human-capital element of the project as key in making this work. He advocates creating a governing body—which will be appropriate for even small institutions—that includes "representation across all areas of the enterprise, while remaining customer-focused and managing risk appropriately."

Additionally, he says, it is necessary to create an education program, since this is a significant paradigm shift. "Cloud migration and implementation is a cultural change requiring full training and communication planning to support the migration strategy," Boville says.

And while it might seem to split from the conversation of culture, it is important to remember that not everything can be appropriately lifted-and-shifted to the cloud, and that comes down to education and culture. BofA's 80% target wasn't arbitrary—20% was deemed inappropriate for the cloud. Numerix's Meyvin echoes this point. "The very first impulse for any company that has an existing technology stack is lift-and-shift. That's where cost can raise its ugly head," he says. "There are applications that are simply not cloud-friendly; while they can be deployed in the cloud, they were not designed to work effectively and efficiently in the cloud."

Blackstone's Murphy notes that every company will likely have to do some combination of lift-and-shift (while it's not always ideal, "legacy reasons" make it necessary) and something that is more targeted—sometimes hybrid private–public, sometimes a blend of multiple public clouds, in addition to internal private projects. From Blackstone's perspective, it would prefer to take a more "thoughtful" approach to take advantage of new capabilities (which lift-and-shift makes challenging) even if these migration projects tend to take longer.

Rick Lane
Trading Technologies

Murphy says moving to the cloud is "all about creating velocity in our technical deployment." But to bring it back to culture, it is vital to have people in place who have done this before, and sometimes that means needing to bring in outside experts to help move the process along.

Blackstone has looked to both hire developers with cloud expertise and it has, as Murphy previously mentioned, invested in a cloud specialist, Cloudreach, to help it move from the left side of that development bell curve to the full-production right side. Murphy compares it to taking a basketball team that is well-oiled and has been playing together for years, and then telling them that they're going to have to play rugby—sure, they're athletic and will learn what to do, but it will make things easier if you have some specialists to help in the transition. Hence the investment in Cloudreach.

Aaron Painter, CEO of Cloudreach, which launched in 2009, says there are different skillsets needed to be able to architect for different cloud environments. As a result, if a company is looking to deploy a multi- or hybrid-cloud strategy, having players with specific skillsets will make the process easier.

"One of the biggest unforeseen challenges that people don't take into account is the culture change of their organization. People often think of this as a business change or a technology change, but it's more about the cultural transformation that they're trying to drive in their organization," Painter says. "Things change so fast that even the smartest, most well-intentioned person has a hard time keeping up because there's so much [that is] new every week."

And while doing everything from scratch and learning from trial and error is something of a Wall Street axiom, when it comes to the public cloud, many others have already gone down this path and have developed expertise after taking their lumps in real-world situations, Murphy says.

"If I could do it all over again, I'd go faster bringing in experts to help my team get up the learning curve," Murphy advises. "I think we're getting there—and certainly we're in a good spot now—but if we had brought in the experts sooner we probably could've made more progress. The number one thing is don't assume you can do it yourself—because you probably can, but it's just going to take you way longer to learn it yourself than if somebody is teaching you who's been there before."

Navigating the Matrix

Northern Trust began its cloud experimentation in 2008, building private environments at a time when financial services firms were still leery of the cloud, to say the least, and the idea of public clouds for the capital markets was still somewhat anathema.

Joerg Guenther, chief information officer for Northern Trust Corporate & Institutional Services, says that back then, public cloud options weren't ready, but today they can handle the production loads and instances, while providing the robust security required for a financial services firm's business-critical applications.

For its private-equity blockchain solution, it has partnered with IBM. On the front-office side, it is using the AWS ecosystem to develop solutions for Matrix, the bank's new global asset servicing platform. It represents Northern Trust's first product that is exclusively running in public cloud, Guenther says.

Matrix will take advantage of containerization techniques that are becoming increasingly popular when used in conjunction with the cloud, such as Kubernetes and Docker frameworks. For the project, Northern Trust has also partnered with Pivotal Cloud Foundry, a platform-as-a-service offering that is cloud-native. The architecture lends itself to be distributed and deployed to a cloud environment, he says. It is vital to have a strict process in place for deciding

what should and shouldn't be moved to the cloud—what can be lifted-and-shifted, and what will require hands-on architecting.

"It's really important, for every application you want to migrate, that you perform what I would call an 'application disposition'—you actually understand if this application is cloud enabled, if it is suitable for the cloud, or if it is something that should not be moved to the cloud," says Guenther. "You need to understand what is a good application for cloud deployment, and what is not. If you make mistakes in that early stage, you end up either reinforcing applications, or you just pay the price by having to redesign it again and again."

While oversight and culture might seem straightforward, they are anything but. "A lot of people underestimate how they demonstrate governance, control and oversight in a public cloud framework," he says, but it does take a different way of thinking about connections and architecting. "It depends on your use-case: What data is there and what business is it actually touching?"

The Beginning

In Italian families, with variations told in other cultures, there's a well-known tale about the importance of the details of a project. The story goes something like this: Enzo was a renowned architect and built the finest homes in Calabria (or whichever province the teller's Italian grandmother is from). His mitering was perfection, the nails invisible. Everything fit like a glove.

After 30 years of building homes for a private contractor, he was ready to retire. His boss pleaded with him to stay on, and Enzo agreed to build one more house. Considering that he had one foot out the door, he decided to cut some corners. The house was fine, but hardly lived up to his standards. When it was completed, the contractor thanked Enzo for his service, and gave him the house, fully paid for. The moral? Don't cut corners.

While not Italian, Blackstone's Murphy appreciates the gist of the story, but offers a different take. Some might like to think that cloud is easy—plug it in and the cost savings will flow like the River Po. That is not a reality. The key is to pay close attention to detail.

"Everybody wants to believe it's cheap and easy, so the first thing I would do is refute that, and say you can do some proofs-of-concepts to learn, but don't let the proof-of-concept become the end-state—that's the biggest risk that I see, because people can get enamored of the quick win. So do some proofs-of-concept to take a first step, to learn, to get your staff familiar, and then go back and say, 'How am I going to get there with my broader environment? How am I going to govern and really have a strategic approach?'" Murphy says. "And if you can afford to, go the slow, methodical way. You could put a house up in a weekend if you really needed to, but it would probably be bad quality. If you take your time and do it right and you wire for the future and put in the proper insulation, you could probably live there forever." wt

Acquisitive Exchanges Find Dealmaking Is Only Half the Battle

While the large-scale exchange mergers of yesteryear may be over for now, regional bourses are still finding themselves in the M&A crosshairs. Yet for those operators that pick up smaller rivals, technology and data integration often prove to be trickier than antitrust approval. By Josephine Gallagher and Hamad Ali

Tie-ups between the stock exchanges that bear the names of cities and countries always make headlines. But, for those involved in the deals, once they get past the boardroom, the real work can lie in picking apart technology and infrastructure. It is not often an easy task. The technology and data burden can often involve many months or years of planning and integration, especially in circumstances where exchanges are anchored to legacy systems.

"Getting to the requirements is often the hardest part of the project, because these systems have often been run for many years, sometimes decades, so understanding exactly how they work is a challenge and you have to understand what you are trying to build," says Chris Isaacson, executive vice president and COO at Cboe Global Markets.

Acquisitions or mergers come in different shapes and sizes. But a common challenge across everyone is weeding out inefficiencies and tying together a multitude of fragmented systems.

Cutting and Consolidating

Today, global exchange groups have evolved into colossal organizations with lucrative businesses—often acting as marketplaces, technology vendors and major data providers under the same roof. However, traditional exchanges have seen a significant blow to their dominance in recent years, as alternative trading venues such as multilateral trading facilities and dark pools continue to populate the market, and pushback from the industry over data fees and other areas has led to the emergence of new competitors, such as the Members Exchange in the US. With that, merger and acquisition (M&A) activity has become a natural trajectory for many exchanges in an effort to remain competitive and stimulate growth in an already squeezed marketplace.

"A lot of assets are now available on most exchanges [and venues] and there is a lot of choice in terms of where you can buy or sell a given asset," says Guy Warren, CEO of ITRS. "Exchanges have declining volumes, which is the reason for this consolidation. They are not getting organic growth and therefore going for inorganic growth by acquiring other companies." There have been several significant exchange mergers and acquisitions over the last decade. Some of the most notable global examples are the Intercontinental Exchange Group's (ICE's) takeover of NYSE Euronext in 2013 and Cboe's acquisition of Bats Global Markets in September 2016. The initial planning for such a wide-scale integration begins by mapping out the level of overlap between systems, clients connected to the platforms and the crossover of products provided.

Migration projects require an extensive assessment of all technologies involved to identify inefficiencies and decommission old, inferior systems. According to Cboe's Isaacson, the process entails ripping out the weaknesses and adding new features to stronger existing platforms. Cboe, for instance, is in the middle of a multi-year migration project where it is moving all its options platforms to Bats technology. In May 2018, it completed the move of its C2 Options Exchange and is expected to finalize its C1 Options Exchange migration by October 2019.

As part of the migration process, another important element is evaluating the data being transferred to the new systems. The acquiring firm will have to identify valuable data, normalize it and port it to the platform in a standardized format. To complicate things further, exchanges will have to consider the regulatory obligations of each firm involved when managing and removing data from systems. Under the General Data Protection Regulation (GDPR), for instance, the acquiring firm will have to consider the legal requirements, among other areas, when it comes to the movement of data across jurisdictions, and data retention.

In other cases, M&A can impact a firm's workflows, processes, and even its culture. It can involve scaling back on departments or technical teams that are being integrated to cover the same operations. This was a concern when talks of a merger between the London Stock Exchange Group (LSEG) and Deutsche Börse arose in 2016. Although the deal was ultimately blocked by the European Commission over antitrust concerns relating to the LSEG's fixed-income trading operations, one of the questions at the time was which technology platform would prevail between the two European heavyweights.

"In these circumstances you would select the technology that is the most modern, the most cost-effective, and the one that can scale. Scaling up is key because with some technologies you can add markets, hundreds of new products or hundreds of new clients at the same cost base," says Anthony Attia, CEO of Euronext Paris and global head of listings.

In many cases, regional exchanges do not operate their own proprietary technology, but rather outsource to some of the major operators. When Euronext acquired the Irish Stock Exchange (ISE)—now known as Euronext Dublin—in April 2018, the local exchange was originally using Deutsche Börse's trading platform. Deutsche Börse declined to comment for this story.

According to Euronext's Attia, acquiring firms that outsource their technology can enable a simpler migration compared to exchanges using complex and customized proprietary infrastructure. It took a total of eight months for ISE's services and operations to be moved onto Euronext's in-house exchange technology, Optiq, with the final touches completed in February 2019.

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Anthony Attia, Euronext Paris

Although the process is faster when dealing with smaller exchanges, these projects still carry significant challenges. Exchanges are becoming increasingly complex and diverse, making the integration of systems burdensome. They comprise multiple cogs in a mammoth-sized machine—they are made up of matching engines, smart order-routing tools, market surveillance capabilities, analytics, databases and often clearinghouses and central securities depositories, not to mention investor relations tools and technologies specific to listed instruments or initial public offerings. When the exchange in question also covers markets such as options, futures and other derivatives, the complexity can be compounded in an exponential manner.

"You need to map all the systems on both sides and see how they can be combined. If you have two systems that are doing the same thing, you decide the ratio between the efforts in its migration versus what you gain in stopping one of the systems," explains Attia.

Making sense of these fragmented systems is one thing, but securing connectivity and maintaining system integrity throughout the process is a whole other ball game.

Chris Isaacson, Cboe Global Markets

Anthony Attia Euronext Paris

Connectivity

High-speed data connections, microsecond-level latency, and uptime performance are the three cornerstones of a typical stock exchange. Its infrastructure will be built to withstand huge volumes of transactions and it will have significant operational resilience. One of the greatest challenges is preventing connectivity issues or technical failures during migration projects. The bottom line is to ensure all stakeholders experience minimal disruption, if any, to services and are supported throughout the entire process—including via the provision of education about the new systems, regular communications about updates and the allocation of dedicated weeks for testing.

"You have to put a timeline that your customers can be ready for, because the goal depends on 100% customer readiness. We can be ready but if our customers aren't then it doesn't really matter; it's a failure unless they are all ready," says Cboe's Isaacson.

This also applies to third-party vendors responsible for built-in technologies, security software, databases, and hardware infrastructure. Each partner must be aligned with the timeline for launching the combined services, and must work in sync with the exchange to successfully deliver the project. In some cases, a client might not be registered with the lead exchange involved in the acquisition or merger. If this occurs it will have to decide whether to subscribe to the evolving firm by switching over or terminating all access to the former exchange. Sometimes this might be unlikely, such as when considering large-scale acquisitions, as most major banks or asset managers will be registered with the biggest exchanges on the planet. However, the takeover of regional exchanges or trading venues might require localized firms to be on-boarded and made familiar with the newly combined marketplace.

One solution for simplifying the migration process is to implement standardized exchange platforms. Global exchanges such as LSEG, Nasdaq and Deutsche Börse are major providers of exchange technology, which is often used by regional exchanges with smaller budgets for developing their proprietary platforms.

"When exchanges first set up in a country, they try to build their own matching engine, but it is very expensive to do that. So most people are now standardizing platforms that are provided by exchange providers," says ITRS' Warren.

Out of the biggest providers, Nasdaq's matching engine technology is used by 70 global markets and LSEG's MillenniumIT platform, which is developed primarily out of Sri Lanka, is rolled out to more than 40 clients around the world. The offerings cover trading solutions, algo capabilities, surveillance, and clearing, among others. The standardized platforms can be used to create markets for any asset class and enable the end user to build additional complex features on top of the technology. As the heavyweights build and sell their technology to smaller market operators worldwide, it allows for easier pickings for the larger exchanges when they are seeking to broaden their geographical footprint through acquisition.

"Slowly but surely, these mammoth groups have been buying up regional exchanges in a consolidation play, and I see that continuing for the next few years," says Rob Boardman, CEO Europe at agency broker ITG, which itself was recently acquired by Virtu Financial in a deal that finalized on March 4.

> "Slowly but surely, these mammoth groups have been buying up regional exchanges in a consolidation play and I see that continuing for the next few years."
> **Rob Boardman, ITG**

Rob Boardman
ITG

Boardman continues by explaining that the industry is "seeing the death of regional independent exchanges," as this strategic move has fast-tracked the ability to ramp up acquisitions. According to Euronext's Attia, standardized platforms can bolster client connectivity and access to a wide pool of liquidity. Single platforms can allow for a more frictionless experience when trading various assets across multiple markets. However, not all examples fall within this bracket of claiming market share by rolling out their technologies across global markets. ICE, in particular, has flexed its muscles in terms of acquisitions over the years, picking up more than a dozen regulated exchanges and marketplaces to date. Its approach has been to finalize the takeover and onboard its new subsidiaries to its own technology.

"When they acquire, ICE tends to say 'whatever you are using, get rid of it, you are going to be using our standard platform now,'" adds ITRS' Warren. ICE was unable to respond in time for publication.

Beyond regional clients, a new market has emerged for providers of exchange technology. The cryptocurrency space has demanded attention from institutions and as part of that are investing in traditional technologies to help inject confidence in trading digital assets. On January 22, the Atom Group, a Hong Kong-based crypto fintech firm, announced its implementation of LSEG's Millennium Exchange platform to support its AAX digital asset exchange. These examples are becoming increasingly more frequent as crypto firms are turning to professional-grade platforms in a bid to legitimize their position in the traditional world.

"Digital asset exchanges want to be able to demonstrate that they are taking technology seriously by leveraging established, scalable financial market infrastructure to support their business growth," says Ann Neidenbach, chief information officer at LSEG Technology.

This push for territory across regional and minority markets demonstrates a new form of acquiring dominance and firepower for exchanges. Although deploying standardized technologies at a large scale could simplify tie-ups or takeovers, in the long run, consideration must be given to whether this would prove favorable for competition, costs, clients and ultimately, the end investor.

But as it stands today, the burden of migrating systems continues to frustrate the industry, and some firms are turning to advanced technologies to offer a solution. However, the concept of cloud-based exchanges may prove promising even if there are several roadblocks that have yet to be overcome.

The Future Roadmap

Cloud technology has made significant strides in recent years among financial institutions. Providers such as Amazon, Microsoft, and Google have ramped up campaigns to instill confidence in their services for migrating data and functions to the infrastructure. In addition, the increasing cost pressures of maintaining in-house servers, versus the relative ease and cheapness of cloud scalability, have paved the way for most banks and asset managers to incorporate cloud in some shape or form over the next few years. For exchanges, the cloud roadmap has yet to be carved out in full. According to Euronext's Attia, many are keen to leverage the technology, but it has a long way to go to support microsecond matching engines or high-powered trading functions.

"Cloud providers are making huge progress with the financial industry, focusing on data, data lakes, and analytics, etc. The part that is not yet in the cloud, however, is the matching engine, as they still need to reassure the industry on some specific low-latency and robust aspects. But this could come in the next five to 10 years," he explains.

In the event of M&A activity, there may be potential to accelerate the exchange-to-exchange integration on cloud technology and fast-track the migration process. The logic behind this is that data and services can be moved more easily from the cloud's infrastructure rather than multiple fragmented systems, likely from a variety of proprietary and outsourced datacenters and servers. But the cloud has yet to adapt to the sensitive requirements of exchanges, taking on not only the challenge of low latency but co-location. For decades, trading firms have positioned their servers and systems close to exchanges to shave off valuable microseconds for executing high-speed orders and receiving near real-time analytics. Migrating these services to the cloud could complicate the constructs of the market as trading firms would need to be located near the cloud provider's servers.

Ann Neidenbach
LSEG Technology

Guy Warren
ITRS

"Co-location is very important and it's where your clients need to be really close to your matching engine. The market is built on a community of market participants and exchanges, and they all need to be together," adds Attia.

Although cloud technology has found its way onto the agendas of many firms, it must be fully mature before it is able to be applied to a variety of use-cases driven by latency and geography. According to Isaacson, today's cloud is more suited to functions such as variable compute, data storage and possibly even disaster recovery applications, although he doesn't rule out further applications in the future.

"I'm never going to say never, but requirements for primary exchanges are too high for what's offered by the cloud today. As the cloud offering matures, it may just happen," he adds. wt

ASX Offers Free Blockchain Settlement to Lure Early Adopters

ASX will release a blockchain replacement for its Chess settlement system in 2021 with a free trial period to attract users to connect directly. But, as officials tell *Risk.net*'s Luke Clancy, the platform offers more potential than just cost savings on clearing.

The Australian Securities Exchange (ASX) is rolling out a blockchain-based trade settlement system, and will initially offer the service free of charge to lure banks away from using industry-standard connections such as Swift and AMQP.

The exchange will offer the three-year teaser rate for access to the blockchain system—which will replace ASX's creaky Clearing House Electronic Subregister System (Chess)—beginning in the first half of 2021, *WatersTechnology*'s sibling publication *Risk.net* has learned.

The project is viewed as a litmus test for installing distributed-ledger technology (DLT) at scale inside a large financial infrastructure.

Customers would access the ledger via a "node." Access beyond the initial three-year period will be discussed with participants at least 12 months before it ends.

Alongside the rollout of blockchain, ASX will introduce the ISO 20022 messaging system, an industry standard for electronic data interchange and itself a break from ASX's current 25-year-old communications system based on the External Interface Specification standard. The coming ISO option will permit AMQP and Swift messaging, and will go live at the same time as ASX's blockchain option.

Those using the AMQP protocol will pay a monthly fee of A$495 ($349.60) to connect to ASX's own telecommunications network, ASX Net. AMQP is an open-source protocol developed by JP Morgan Chase in 2003 that is supported by banks including Barclays, Credit Suisse and Goldman Sachs.

The second connectivity option is Swift, the world's biggest financial messaging system, though this will be more expensive. Besides an administration fee, any costs ASX incurs in meshing with the Swift platform will be passed on to its users on a pro-rata basis. They may also be charged a setup and connection fee if they connect via Swift after the go-live date.

"AMQP is every bit as good as Swift, but it doesn't carry the message costs that Swift charges to use SwiftNet," says Cliff Richards, executive general manager for equity post-trade services at ASX, and the person in charge of the Chess transition.

"Chess sends a lot of messages, as will its replacement," Richards says. "If a client chooses a Swift connection, they will be picking up a tab from Swift charging them for the messages they send. And when Swift charges us, we will be passing that cost back to the relevant client. If they choose a node, there are none of those costs."

The head of clearing at a top-tier investment and custodian bank in Australia, which is currently a big Swift user globally, says it will instead connect through AMQP.

"First, there is the unknown of what ASX will pass on for having to set up Swift infrastructure. Second, AMQP will not be a massive buildout for us," he says. "Also, the bank is a big user of Swift messaging globally, and this would put the Australian operations at a higher level—so we would have to pay for a bigger allocation of the global Swift costs."

He says his firm's back office is "pretty wedded" to the ISO 20022 format, but it will take a node "for experimental purposes," adding that the firm "will use it at first on a test mode and start to get more comfortable, so that over time that might become the primary way we do things."

Stephen Lindsay, Swift's head of standards, says he welcomes the different options for connectivity, but says ISO 20022 formats can bring significant

"If a client chooses a Swift connection, they will be picking up a tab from Swift charging them for the messages they send. And when Swift charges us, we will be passing that cost back to the relevant client. If they choose a node, there are none of those costs."

Cliff Richards, ASX

advantages to back-office and downstream processes. Swift, he says, is keen to support ASX, "to ensure that the implementation of ISO 20022 conforms to best practice and is aligned where possible with implementations in other markets."

However, the bank head of clearing says Swift will be "extremely annoyed at the ASX costing outcome, as they spent a couple of years mapping their messaging to ASX."

If it is annoyed, Swift isn't showing it publicly. "We don't know enough about AMQP to be able to compare the option with SwiftNet," says Lindsay about the potential threat from the more economical AMQP option. "For the Swift option, the same benefits exist for our members who use us to connect with hundreds of counterparts and market infrastructures."

In January 2016, ASX began reimagining its post-trade platform for cash equities, envisioning real-time reconciliation of data if banks plugged directly into its new system. ASX says direct connection through a node will obviate the need for firms to run siloed databases outside the ledger, and will drastically cut the number of reconciliation messages crisscrossing the industry.

The exchange also believes it can deliver substantial savings by using blockchain. Consultancy Rice Warner has estimated the industry as a whole spends A$23 billion ($16.3 billion) each year on back-office processes currently paid by superannuation funds, 2,300 listed companies, and several million investors—as well as A$100 million ($70.8 million) of annual costs paid by the clearing and settlement industry—some of which ASX could target with a cheaper alternative.

ASX also says that widespread adoption of its blockchain will enable the creation of new value-added services by other market participants.

For example, other banks are curious to test out some of the proprietary technology within ASX's new platform. Designed by financial technology firm Digital Asset, it will use Digital Asset Modeling Language (Daml), a code for smart contracts written in so-called functional programming. This form of programming is elegant in execution, sources say, though it remains somewhat under the radar, and would allow firms to update portfolios in real time throughout the day, bringing advantages to risk management and client reporting functions.

"If you take a Daml node, and you're a scale player, you want to see efficiencies in terms of cost savings," says the head of cash equities executives as a global custodian. "But you can also start to think of some interesting things to do with real-time data."

For example, the custodian speculates that real-time data could make it possible to create a dynamic share registry, updated near-instantaneously, as well as cutting the time needed to execute or deliver any number of services, such as dividend payments, while the innovation head of a third global custodian says real-time data could "remove transactional friction."

ASX is one of a number of organizations looking into the cost and business advantages of blockchain. Others include Deutsche Börse, the Swiss Digital Exchange, and the Depository Trust & Clearing Corp.

In April, ASX will grant free access to showcase a small portion of what will be the system's full functionality. If the new Chess system is deemed a success, ASX may also migrate other products listed on the exchange, including derivatives and bonds, to the new platform.

In fact, one of the milestones by which the exchange will measure the success of the blockchain rollout is the use over time of direct ledger connections by clients. "It is important to note this project starts with clearing and settlement, but does not stop there," Richards says. wt

Banks Brace for ‘World’s Largest Corporate Action’ as Libor Switch Looms

The transition away from Libor is a mammoth task for the banking sector—one that the industry is increasingly finding itself woefully unprepared for. By Hamad Ali

Beset by scandal, reputationally bankrupt and now increasingly under pressure, Libor is nonetheless still the key reference rate used in nearly all major financial instruments globally. As regulators have mandated a shift away from the benchmark by 2021, however, the industry is beginning to realize the scale of the challenge before it.

Part of the problem is that replacing Libor, an averaged interbank offered rate (IBOR) governed by submissions from panel banks, with an overnight rate calculated from actual transactions, is that it isn’t just a like-for-like transplant to a new benchmark. It’s also geographically fragmented, with the US opting for the Secured Overnight Financing Rate (SOFR), the UK going with the Sterling Overnight Index Average (Sonia), and continental Europe using the European Overnight Index Average (Eonia).

That, by itself, is challenging enough, but add creaking systems and aging infrastructure to the mix, along with a near-unfathomable amount of contract re-papering that needs to take place, and you have a toxic cocktail that will almost certainly turn trading operations on their head over the next few years.

“It is a bit like Brexit,” says Alastair Sharpe, head of London rates trading at Credit Suisse. “There are a lot of issues that are very difficult to resolve.”

Crunch Time

Developing an understanding of how problematic this may be requires an appreciation of just how embedded Libor is within finance—and how unprepared bank technology is for the change. Libor is used in everything from loans on the retail side, to derivatives documentation and monetary policy on the institutional end. Changing the mechanism by which key aspects of these contracts are governed, such as the interest charged on mortgages and the particulars of rates trading contracts, isn’t simply a case of running a find-and-replace on the word “Libor” and substituting it with “Sonia.”

Just ask Adam Schneider, partner at Oliver Wyman, who says it doesn’t matter what the new rate is—when Libor is out, the new reality will be “a hard technology and operations exercise that the industry has not seen before.”

Schneider says if Libor was to end tomorrow, it easily would be “the world’s largest corporate action,” because no one has benchmark references automated, so once the formulas shift to the new rate, it will create a lot of work "and a lot of that is buried in detailed documentation" that can't be parsed through automation and would require humans to read.

That hasn't stopped many from turning to emerging technologies to assist, given the unpalatable—and, most likely, impossible (for humans)—scale of paperwork to amend.

"There are probably enough documents out there that it would take you and me until the end of the universe to read them without a computer," says Credit Suisse's Sharp. "That is the point: Libor is embedded into so many things."

One possibly augmentative approach—if not an outright solution in and of itself, may be to use artificial intelligence (AI). Paul Feldman, a director in Chatham's risk management consulting practice, has had clients asking about the use of natural-language processing (NLP) as a way to help in moving to the new rates. Some of these clients have a back book with tens of thousands of loan contracts, each of which exists as a document and a reference in a corporate book of records, a loan management system, or a trade-capture system.

Feldman says technologies like NLP are being considered for scanning many documents quickly. "To prepare, or train, the system for use, a human expert evaluates and annotates an adequate sample of loan documents," he says. "The trained system can then be applied to a large inventory of many thousands of documents. The system is able to do the annotations on its own in those documents, capturing the relevant classifications, fall-back language and other terms and conditions into a structured data format. While this tool does not completely replace personnel, it has the promise to dramatically reduce the degree of time and effort required to complete the IBOR transformation task."

He says there will still clearly need to be human review of the work, as this particular machine-learning application is nascent, but it has promise. "It is something that leading entities are using in the IBOR transformation process, and many of our clients are asking us about," he says.

> "Libor is a price. I bet you get coffee at Costa Coffee or Starbucks, and they don't change the price of coffee every day, even though the price of the beans moved a little."
> **Adam Schneider, Oliver Wyman**

In many ways, the industry has had a test case for such an exercise already. During recent regulatory reform around margin requirements for non-cleared derivatives, for instance, dealer banks were required to hire battalions of lawyers to comb through agreements and amend clauses where necessary.

Paul Feldman
Chatham

NLP proved its worth here for many, allowing for the rapid re-papering of many thousands of contracts in time for a tight deadline, but the scale of the challenge surrounding Libor is many factors larger.

"We don't exactly know how we are going to re-paper every single Libor-related deal," says one official at a major bank. "Or, indeed, whether that is going to happen. They might come up against obstacles that are as yet unknown. And so that still needs to be done and is ongoing. And I am sure that institutions like ours and others like that are well ahead of the field, but even then there is a long way to go."

Checking Boxes

Perhaps the only challenge more daunting than the uncertainty around how the task will be managed from what is already known, is attempting to have the proper technology in place to deal with upcoming gray areas. Philip Whitehurst, head of service development, rates at London Stock Exchange Group (LSEG)-owned clearinghouse LCH, says that systems trying to process Libor-based trades expect that the fixing information provided covers the entire three-to-six-month term rate period. He says systems given that information can calculate the payment and move on to other issues with the contract, such as forward-rate projections.

Phil Whitehurst
LCH Group

"The difference with an overnight rate is that your system hasn't, at the start of the period, gotten all the information it needs to understand the payment that will occur," Whitehurst says. This results in a "wait for a series of fixings" during which the system checks more information over a longer period of time, just to be certain of the payment. "This disrupts the workflow," he says.

Indeed, a major complaint with risk-free rates like Sonia and SOFR is that they are overnight rates, in a time when end users prefer term-rates for periods of three or six months.

"Libor is a price. I bet you get coffee at Costa Coffee or Starbucks, and they don't change the price of coffee every day, even though the price of the beans moved a little," says Oliver Wyman's Schneider. "So, as a price, Libor is a little stickier than a calculation that results from yesterday's trades, which is what SOFR and Sonia basically are."

Some have proposed using listed derivatives for the future to apply the fixing, which could ease some pricing aspects of using overnight rates. It could also reduce the scope for benchmark manipulation, even if it doesn't get rid of the possibility of that occurring. But the problem is risk-free rate (RFR) futures are not as liquid as the over-the-counter (OTC) market in the UK. It leads to the question of who would want to write a financial contract against a fixing that would be, as yet, unknown.

> "First of all it, implies prices into the market, so if you want that spread to trade, you are selling Libor and buying Sonia, someone on one side might be buying Sonia and someone on the other side might be selling Libor, and the fact that you have got a spread position means that you get filled on that trade."
> **Andy Ross, CurveGlobal**

Another problem is that, in order to use a listed derivative, a model is required, which may apply futures prices and come up with rates for three months or six months that might not be the same that is being quoted in the market. When rates are stable and there is a very flat yield curve, the prediction is likely to be pretty close. But if it is stress-tested to a time when rates are moving, such as back in 2008 to 2009 during the global financial crisis, the model would not be able to come up with the correct answer without being continuously amended. The rate produced by the model does not equal the rate produced by dealing in three-month Sonia or SOFR.

"The UK is favoring a quote-based methodology because it is point-in-time," says Credit Suisse's Sharp. "And they have sampled quotes that people can deal on, take a bid market, and that is how they plan to fix it."

However, at the moment, the market in short-term rates is essentially done via voice brokerage, apart from listed derivatives. Sharp notes that almost no one trades electronically. It isn't that nobody has tradeable prices on a platform like Tradeweb or a Bloomberg, but that is a tiny percentage of the market. "I would say less than 1%. Until that changes, it is going to be very difficult to have this sort of quoting system," he says.

"There are many places, and Credit Suisse is one, that don't publish firm prices in Sonia or Eonia," he says. "So we have a page where you can look at Sonia prices, but they are not firm quotes, so it won't be suitable for making a fixing offer—we are one of the top one or two market-makers in Sonia and we don't quote firm prices. Until that changes, until we invest in that technology, it will be difficult to get representative, quote-based fixing because there just won't be enough independent sources that will be able to be used for it. That needs to be changed and money needs to be invested in that, both by us and by the majority of the players because I would say only a few have that currently."

Libor Beyond 2021?

What makes the RFRs more robust is that unlike Libor, they are based on actual transactions. The Libor scandal of the past few years implicated a number of top banks in the manipulation of interest rates, and resulted in fines totalling billions of US dollars, along with jail sentences for a number of executives and traders. In contrast to Libor, anyone attempting to manipulate RFRs would likely have to alter the actual volume of transactions to have any notable influence on the rates, which offers stronger protection against manipulation.

Adopting one of these RFRs doesn't mean banks won't face new challenges. "It doesn't seem very obvious at the beginning, but there is tons of stuff in the background that actually needs to be done before we could transition every single deal we have to Sonia," says Sharp.

Yet, banks may just be asked to do the impossible, as regulatory patience is certainly not unlimited, particularly on the part of UK watchdogs that have often emerged as loud voices in the debate over shifting from Libor. And 2021 is not far away, so the industry doesn't have too long to figure out how to fill the gaps.

"The main point is that we are expecting Libor to conclude at the end of 2021 and therefore firms are all encouraged to transition to risk-free rates and transition is progressing," says Nausicaa Delfas, executive director of international at the Financial Conduct Authority (FCA). "We are doing a lot of work here and also in the US and our CEO is also co-chairing a group with Jake Powell from the [US Federal Reserve] on that. So our interest is that firms transition. Obviously there are challenges from moving from one rate to another but we do expect that progress to continue."

While regulators are keen for Libor to go, experts are divided about how long its departure could take. "I am 100% convinced Libor will continue to exist. I am fairly controversial on this issue," says Sharp. "I think people will still want it, but instead of being 90% of the market, it will be like 10% or 20% of the market. And RFR will be the main financially traded instrument."

Regulators have also accepted that some element of Libor will remain, even if the bulk of the market transitions to using Sonia, SOFR, Eonia or another derivation thereof. In a speech in January 2019, Edwin

Schooling-Latter, director of markets and wholesale policy at the FCA, said that the regulator was aware that Libor cannot simply be dropped in some instances.

"While contracts of this kind should be a diminishing share of the total over time, there may, because of historical issuance, still be a material volume of such contracts in cash markets into the 2030s," he said.

There have also been some interesting initiatives to help with the benchmark switch. Last year, CurveGlobal, the interest rate derivatives joint venture between the LSEG and a number of major banks, introduced an inter-commodity spread that allows people to put into the market a price to sell Libor and buy Sonia. It is one way to transfer risk between the two rates.

"First of all it, implies prices into the market, so if you want that spread to trade, you are selling Libor and buying Sonia, someone on one side might be buying Sonia and someone on the other side might be selling Libor, and the fact that you have got a spread position means that you get filled on that trade," says Andy Ross, CEO at CurveGlobal. "It is on screen, it is visible for people that they can see it. Second thing is it is a great example of technology helping achieve a regulatory aim, which is the transition from Libor into Sonia."

Fear of the Unknown

While Sonia is perhaps more robust than Libor, it also comes with a lot of unknown factors—but these do not necessarily have to be roadblocks. Yolaine Kermarrec is a partner and co-head of CFO advisory capital markets at Ernst & Young who advises investment banks on regulatory change and financial transformation. She says there is a wide range of preparation underway, and that those who start this project with the right attitude are best-positioned to win. "Certain banks are opting for a strategy of accelerated adoption of new risk rates; they focus on being ready to meet new client demand on products referencing risk-free rates," she says. "They see the IBOR transition as an opportunity to protect and/or improve their client franchise. On the other side of the spectrum, a number of banks are in a 'wait and see' approach and are wary of spending too much effort and money onto their IBOR program."

She says she sees it as a real opportunity for banks to improve their infrastructure in areas where there has been, historically, a degree of under-investment. "A number of banks want to rationalize and revamp their treasury processes and technology," she says. "Some are using IBOR as an opportunity to reconsider the methodology for fund transfer pricing to ensure it is consistent across geographies, and to fix some data issues once and for all."

Therefore, the transition away from Libor could accelerate some of the existing strategic transformation banks had planned already. Kermarrec thinks it is important that banks don't only see this as a risk management and compliance program, but really go beyond the compliance agenda to take it as an opportunity.

For banks there can also be a pricing considerations. "Certain banks have voiced that Libor continuing beyond 2021 could represent an important conduct risk. This is because it would increase the length of the period during which they will operate in a dual-rate environment. There is a risk that clients come back to their banks a few months after a transaction, and contest the price they have been offered for one or the other type of products," says Kermarrec.

But while some in the banking industry are adopting a wait-and-see approach, Libor is slowly starting to shrink in terms of market proportion. "Sonia is now about 20% of OTC swaps trading in sterling right across the curve," says LCH's Whitehurst. "About 18 months ago, that figure was much closer to 10%. This is obviously very strong and positive growth for Sonia relative to Libor."

A banker working in the global markets spoke on the side-lines of an industry event on condition of anonymity. She complained the 2021 timeline was too short, although the intention

> "Certain banks are opting for a strategy of accelerated adoption of new risk rates; they focus on being ready to meet new client demand on products referencing risk-free rates."
> **Yolaine Kermarrec, Ernst & Young**

was good. "How do you deal with that mismatch between the hedging of the asset, which is based on Sonia, and the funding of the book, which is based on the three-month Libor? There is still an issue." It's a headache for quants at banks creating models and curves around the new rates.

Oliver Wyman's Schneider compares the Libor rate to drinking coffee. Many people don't know where the beans in their drink come from, or how the caffeine is extracted. They don't need to. They just order coffee. Similarly, Libor is ubiquitous, but many people don't know the hows and whys.

"The average response to Libor going away is literally, 'you are kidding,'" says Schneider. "That is the average response. And now it is beginning [to shift to] 'I guess we have to get our work together because, of course our infrastructure is critically dependent on it.' It is like saying the centigrade is going away; it is just hard to get that in your head. That is exactly what we should be talking about right now." wt

Safe as Houses?

If you want the definition of a circular argument, talk to anyone involved with clearing about resilience and recovery. But more pernicious risks remain unaddressed, says James Rundle.

Earlier this year, I was asked to moderate a panel at a conference hosted by the International Swaps and Derivatives Association on the evergreen topic of clearinghouse (CCP) resilience. I agreed, partly out of curiosity, given that this was the beat I once covered extensively as a reporter on our sister title, *Risk.net*, and earlier in my career. Mostly, I was interested to see how the conversation had progressed while I shifted my focus to technology over the past few years. Not much, it turns out.

The topic had circled back, despite innumerable hours spent talking about it around 2015 and 2016, because of what happened at Nasdaq Clearing earlier this year. For those who don't follow this rather arcane corner of the derivatives market, a single trader's positions fell prey to rampant volatility in the power markets, and when said trader was unable to meet the margin call, it blew a hole in the default fund to the tune of more than $100 million, which futures commission merchants (FCMs) were forced to cover.

The good old issues of membership criteria, transparency over margin methodologies, and skin in the game duly resurfaced. And it seems that despite regulatory guidance on these topics from bodies such as the International Organization of Securities Commissions, a tug-of-war still exists between the clearinghouses and FCMs. The more things change, the more they stay the same, to quote Alphonse Karr.

While default management procedures are important to discuss—and, as the incident at Nasdaq Clearing shows, even more important to get right—there remain extant questions that need to be answered regarding non-default losses by both FCMs and CCPs. These are the types of hot water that a clearinghouse can get into when exposed to losses that don't occur as a function of its risk management procedures associated with handling derivatives trades. They include, but are not limited to, investment losses that occur when investing collateral—given CCPs are extensive users of the overnight repo market and are limited by law as to how much they can invest in commercial banks—and operational risks. Chief among those risks are systems and IT failures, and cybersecurity.

> "Given the systemic importance of CCPs… there should be more focus on how the costs associated with NDLs are allocated

An extensive outline of what these non-default losses (NDLs) constitute—and the problems associated with them—can be found in an excellent 2017 paper from the Federal Reserve Bank of Chicago, written by Rebecca Lewis and John McPartland. But the key problem that bears discussion is this: While the industry is focused on having to pony up for default losses, as occurred at Nasdaq Clearing, NDLs are potentially even more severe, because in these instances, CCPs won't have access to the default funds or the waterfall designed to protect the entity during default scenarios. Nor will the CCP have access to more controversial tools, such as variation and initial margin haircuts, that could be employed *in extremis* during defaults.

As LCH's chief risk officer, Dennis McLaughlin, told me a few years ago, these losses are "more pernicious, and much more difficult to manage—and they could bring down the CCP far more easily—than a default loss."

Most CCPs now have sections in their handbooks that address where the burden of responsibility will fall when it comes to NDLs. Some say they will be covered by the CCP, others that FCMs should share in the cost when it comes to stabilizing the clearinghouse, as it's in everyone's best interest to do so. Yet it's still somewhat alarming—particularly in an era where cybersecurity is the top concern for most industries, and finance is routinely listed as the most vulnerable of these—that a fraction of the attention given to well-developed and tested default management processes is applied to how NDLs are handled.

Given the systemic importance of CCPs in the post-crisis trading environment, and their installation as the risk managers of trillion-dollar markets by regulators, there should be more focus on how the costs associated with NDLs are allocated. Deeper questions should then be asked about whether this should stop with the CCPs, or be extended into analysis of the service providers they utilize, particularly as technology provision remains concentrated—in some areas, at least—in a handful of cloud and systems vendors. wt

Delivering Diversity

When it comes to diversity, many companies are excellent at talking the talk, but few actually walk the walk. Jamie explains how data giant Refinitiv is bucking that trend in impressive fashion.

It is not often that I am genuinely blown away by a corporate approach to diversity.

I have done a lot of work around equality. In my previous role at an LGBT publication, gender and anti-discrimination issues were woven into the fabric of the everyday. At *WatersTechnology*, I am fortunate to continue that advocacy by leading panel discussions and webinars on equality initiatives within financial services. I have taken part in hundreds of conversations on the topic, and have witnessed earnest blunders, outright sexist dismissiveness, and all of the ways in between in which clumsy attempts to address inequality—no matter how well intentioned—can fail.

So I was pleasantly surprised by Refinitiv's deliberate and dynamic approach. I spoke to its new head of talent, leadership and inclusion, Audrey Campbell, after the data giant won Best Company for Diversity (Vendor) at *WatersTechnology*'s 2019 Women in Technology and Data Awards.

Refinitiv is in an interesting spot. The company was created in early 2018 when Thomson Reuters sold 55% of its Financial and Risk division to a consortium led by Blackstone. Though not a new company in the traditional sense, spinoffs provide a chance to assess and forge a new identity. Refinitiv is prioritizing diversity, but rather than doing it in the usual way, through quotas, data and salary figures, Campbell says the vendor is taking a broader view by paying attention to the impact of bias.

It is a data company, after all. But rather than using data as a mere benchmark for a quota, Refinitiv is using data to help understand leadership decisions, identify misalignment, and most importantly, help leaders to bridge the gap between their good intentions and the actual impacts of their actions.

So often, the burden of fighting for equality is placed on the oppressed. Women are scolded for not negotiating salaries hard enough or taking maternity leave, while hiring managers bemoan a lack of minority candidates without addressing why certain industries don't appeal to marginalized groups. Refinitiv's approach is remarkable because it is systemic, placing the mandate for change in the hands of the leaders, who of course have the most power to enact change.

> Refinitiv's approach is remarkable because it is systemic, placing the mandate for change in the hands of the leaders.

As Campbell puts it, the approach "moves away from a model where we 'fix' women and moves toward a model where we say, 'In terms of how bias impacts decision-making, how do we understand that, and how do we address that in a holistic way? How do we support women, but also how do we support leaders to be more inclusive in the way that they naturally lead?'"

So far, she says, the approach feels right because beyond addressing the system, it addresses the unwritten rules in the system that influence decisions and—intentionally or not—foster bias.

Refinitiv has set a target of having 40% women on its board by 2020. Yes, that's a quota, but Refinitiv is even being progressive in how it plans to reach that goal—it treats it as non-negotiable. There's no faffing around on deciding whether women with enough talent exist in the company, or requiring advocates to make a business case for diversity. Once the mindset switches from "should we," to "how do we," the conversation becomes more about access and how to level the playing field, Campbell says.

There are several key pillars that bolster the company's efforts toward its diversity goals. First, Refinitiv is deliberate about its use of language to ensure a clear understanding of targets and timelines. Second, it pins down ownership of the goals and hooks it into pay and reward structures, so it becomes a normal part of how staff report to the CEO, and an accepted part of performance management. Third, the firm is looking inward to pay more attention to the feel of the Refinitiv team. It is currently rethinking its employee surveys and updating HR systems so they can more accurately assess how different groups feel about the company, an approach Refinitiv plans to make central to how it analyzes and reports survey data, as well as part of how it solves any issues revealed by staff responses.

Refinitiv is setting a progressive, forward-thinking strategy in its journey toward diversity and equality in financial services. It will be interesting to see whether other influential corporations follow suit.

The Gentle Touch

Financial firms often look to Asia for expansion because of the compelling size of the region's markets. Wei-Shen details how it could prove harder than it seems.

The call to be in Asia is alluring. As the world's largest, most-populated continent, it covers roughly 17,212,000 square miles—about 30% of earth's total land area.

Asia is home to China and India, which have two of the world's biggest populations. According to statistics from the United Nations Department of Economic and Social Affairs, as of July 2018, China had a population of roughly 1.42 billion, followed by India with 1.35 billion. The two countries account for about 36% of the world's population of 7.6 billion people.

This is one of many reasons why global firms headquartered in the big financial centers, such as New York and London, are keen to "get into" Asia. The populations of China and India alone are enough to sustain the companies' revenues, assuming these firms succeed in providing their goods and services there.

The continent is not only known for the size of its population; it is also extremely diverse. Considering languages alone, there is Mandarin, Japanese, Thai, Tamil, Hindi and Malay, to name a few, and I haven't gotten to the different dialects yet. While Europe, of course, has its own battery of languages to deal with, the sheer size of the Asia-Pacific region means newcomers can't rely on proficiency in any one language, such as English or German, and expect to get by.

The number of countries in Asia also means firms operating there have many different regulators to contend with. And the region's financial markets can't be compared with each other as though comparing apples with apples. Take two central banks—the Monetary Authority of Singapore and the Hong Kong Monetary Authority. While they are seen somewhat as competitors, the projects they deal with and the way they execute reforms or implement regulations are quite different.

That said, those that are prepared can see the opportunities and are able to implement their expansion plans in the region.

> "Firms lacked a reliable "one-stop shop" provider for services such as co-location and trading, as well as back-office trade processing

Recently, New York-based trading and low-latency data infrastructure technology provider Pico Quantitative Trading told *WatersTechnology* that it plans to add another 20 datacenters in the next 18 months. The locations it hopes to operate in include Australia, China, India and South Korea.

Pico's managing director and global head of product, Roland Hamann, found local firms lacked a reliable "one-stop shop" provider for services such as co-location and trading, as well as back-office trade processing. He mentioned that tier one investment banks in particular would prefer to have the exact same service in many different locations, rather than have slight variations from an operational perspective.

Of course, he added, there is a regulatory challenge when expanding into Asia. In Europe, for example, rules and regulations are more standardized, making it a much easier process when it comes to onboarding clients in different European venues. In Asia, there could be subtle differences country by country—and even pronounced ones.

For example, when a client orders a cross-connect in Europe, it can be set up in two days or less. In Asia, the usual delivery time is between four and six weeks. This could hinder time-to-market for financial service providers, particularly when clients aim to branch out in a certain region or country.

But that is not stopping Pico. Hamann relocated from London to Singapore in late 2018 to drive the firm's regional expansion. Since then, he has grown Pico's Singapore team to about 20 people.

This includes the hires of former FIS and Newedge tech exec Nicolas Friceau as global head of datacenter engineering, former Colt sales exec Jasmyne Tung as Asia-Pacific regional head of sales, and former BT and Credit Suisse exec Elton Pang as regional head of service operations.

Pico also has two employees in Tokyo, and is aiming to add staff in Hong Kong soon.

So, it's not that it's impossible to set up shop in Asia, it just takes a carefully calculated and carved-out approach—one that may be radically different to what western companies, particularly those in the US and Europe, may be used to. wt

Human Capital

Digital Asset Names Co-Founder Rooz CEO

New York-based blockchain technology provider Digital Asset has appointed co-founder and COO Yuval Rooz as CEO, replacing executive chairman AG Gangadhar, who has served as acting CEO since the departure of Blythe Masters in December.

Since co-founding Digital Asset in 2014, Rooz has also served as CFO, hired most of the company's management, and oversaw the acquisition of four technology startups. Before joining the vendor, Rooz was a member of the investment team at DRWVC, the venture capital arm of DRW Trading, where he spent almost five years as a trader and senior algorithmic trader, prior to which he worked on risk models for Citadel Investment Group's global equities business.

Itiviti Nabs FIS' Mackay as CEO

Swedish trading and technology vendor Itiviti has picked Rob Mackay as its new CEO, filling a slot left vacant since December 2018.

Mackay, COO for cross-asset trading and risk at FIS, will replace Torben Munch, who stepped down at the end of last year. Based in London, he will start on April 1.

Mackay's appointment caps a period of significant change for the Stockholm-based vendor, which completed its merger with Ullink in November 2017. The company itself is an amalgamation of several storied brands within capital markets fintech, comprising Ullink and Itiviti, as well as Nyfix, Orc, CameronTec and Tbricks.

Prior to his appointment, Mackay spent most of his career at FIS, and at SunGard before it was acquired by the technology giant.

Yuval Rooz

Bobby Bhakar

Jonathan Kellner

Tiger Snares Keegan for Strategy

New York-based Tiger Trading Network, a startup order management system for trading digital assets and cryptocurrencies, has hired Alan Keegan as chief strategy officer, responsible for developing the company's go-to-market strategy and identifying new opportunities in the crypto markets as it prepares to launch its initial order and execution management system in April.

Keegan was most recently co-founder of crypto dark pool Omega One, prior to which he was an investment associate at Bridgewater Associates.

Dash Names Palaparthi Compliance Chief

Dash Financial Technologies has appointed Venu Palaparthi as its new chief compliance officer (CCO) and head of regulatory affairs.

Palaparthi, who joins Dash from digital asset electronic brokerage firm Tagomi Holdings, will be responsible for the company's compliance strategy and setting the direction of its internal regulatory policies to meet government requirements.

Palaparthi brings 25 years of industry experience to Dash. Prior to his work as CCO and head of regulatory and government affairs at Tagomi, he was also head of regulatory affairs at Virtu Financial and held senior positions at Nasdaq and Instinet.

LiquidityBook Opens in Sydney

Trading solutions provider LiquidityBook has opened an office in Sydney to support its growing expansion within the Asia-Pacific (APAC) region.

The vendor has also hired Andre Meintjes as its new APAC client services lead, responsible for deploying bespoke enhancements and white-glove support to both APAC-based clients and clients trading into the region. Meintjes previously served as a support officer for ABN Amro Clearing's global execution services arm. Prior to that, he worked in derivatives dealing and operations at Peregrine Derivatives, managing direct market access and internal trades.

He takes over from previous APAC client services head Matthew Howard, who now serves as head of Europe, the Middle East and Africa, and APAC support.

The Sydney office will be opened by Andy Carroll, who left Twitter in 2017 to join LiquidityBook as chief architect.

Bhakar Joins Instimatch as CTO

Switzerland-based Instimatch Global has announced the appointment of Bobby Bhakar as its new CTO.

He joins from interdealer broker BGC Partners, where he worked for 13 years as head of credit index trading and later, global product strategy manager.

Instimatch has also announced three other recent hires, including Marco Rüfenacht as managing director. Rüfenacht was previously at Vicenda Asset Management, which holds an equity stake in Instimatch Global. The firm has also hired Alice Fitton as UK sales manager and Julia Scheidwimmer as head of sales for Germany.

Maiuri Joins State Street as COO

State Street has named Lou Maiuri as its COO. Maiuri was previously the head of State Street's Global Markets and Exchange business lines.

In his new role, Maiuri will have "overarching responsibility" for State Street's infrastructure technology, global delivery, Charles River Development and product teams, and will retain his oversight of Global Exchange, according to the bank.

Karen Keenan, chief administration officer (CAO) of State Street, will now also have oversight for the Global Markets division, which she ran before being named CAO. In addition, Liz Nolan, CEO of State Street in Europe, the Middle East and Africa, will now also head its global delivery unit. She replaces Jeff Conway, who is leaving State Street after more than 30 years with the company. Nolan will eventually step down from her regional CEO role after a successor has been appointed.

Jonathan Kellner to Lead MEMX

On January 7, it was announced that a group of nine financial services firms would come together to launch an equities venue dubbed the Members Exchange. The startup finally has its first public face: Jonathan Kellner, previously the CEO of Instinet.

Kellner joined the agency broker in 2007 after Nomura Group bought the company. He took the CEO reins in 2014, but in August 2018 it was reported that he would be stepping down. Then, in October, it was announced that he would be leaving Instinet take over as the managing director of crypto exchange Coinbase's institutional coverage group, but that pairing fell apart.

Prior to joining Instinet, Kellner held senior trading and technology positions at Charles Schwab, ITG and Morgan Stanley.

Dinneny to Lead Fonetic's US Expansion

Madrid-based voice surveillance specialist Fonetic has hired Thomas Dinneny as head of strategy and business development, with a focus on building out Fonetic's business in Canada and the US.

Dinneny joins from trade surveillance vendor b-next, where he was head of business development. Before that, between June 2014 and November 2016, he was head of compliance, surveillance and derivatives solutions at Thomson Reuters.

Most recently, he founded Product Vision Consulting, an advisory firm targeting emerging fintech companies that need product management expertise.

ChartIQ Nabs Ex-Bloomberg Product Guru Sorenson

Charting and analytics provider ChartIQ has hired former Bloomberg product management veteran Eugene Sorenson as VP of product management to extend the vendor's expansion within financial services and into new industry sectors.

Sorenson spent 12 years at Bloomberg between 2006 and 2018, including roles as product manager for charts and technical analysis, and as director of product management for foundational applications. Before Bloomberg, he was VP of product development at interdealer broker Cantor Fitzgerald, and director of product marketing at data, analytics and trading technology vendor CQG.

ICE Taps Ex-Budapest Exchange Exec for CEE Data Sales

Intercontinental Exchange's ICE Data Services division has hired Noemi Lusztig in London as sales manager for pricing and analytics in Central and Eastern Europe and Africa.

Lusztig spent the past dozen years at the Budapest Stock Exchange as director of its market data sales division, where she was also responsible for PR and communications between 2012 and 2015.

Before that, she spent more than 11 years at Reuters, including five years as sales and customer support manger and country representative for Hungary, and six years as a risk management and transaction services supervisor in Budapest and Geneva. wt

BARNETT'S BIG PLANS FOR RIMES


Andrew Barnett

Before Andrew Barnett was hired by Rimes Technologies as global head of product strategy, he was chief data officer (CDO) at Legal & General Investment Management (LGIM). Naturally, then, he is thinking about Rimes' products from the perspective of a data chief.

At LGIM, Barnett was brought in by the previous CDO when the investment management firm was in what he calls the "first phase" of the data management journey—data integration and governance—which he says is generally followed by a business optimization phase, then value creation in phase three. In the past five or so years, he says, CDOs hired for non-governance roles found themselves under a C-level expectation that they will "fast-track to value creation, and it just doesn't happen. It's not that easy to get there, and many get stuck in the data integration and governance phase."

Barnett says he ushered LGIM into phase two, and that as a result of its environmental, social and governance work, the firm started to move into phase three. "My key frustration was that I was always looking at the market for an outsourced managed data service. [So if] I ever moved into another CDO role and had the opportunity to start again, I would try and do all that phase-one activity with an outsourced enterprise data management service. I don't go and buy the technology; I don't go and recruit and train the people; I don't go and source the data and the management; and I don't try to stick them all together with the business operating model.… I didn't need to build what I built in LGIM. I could have taken maybe 60% of the services and, subsequently, the people from Rimes, and then put a strategy together," he says.

When the Rimes opportunity presented itself, Barnett was already familiar with the company, having worked with it while at LGIM. He believed Rimes could offer an outsourced enterprise data management service via its existing team, technology and content management capabilities. "A key reason [to join Rimes] was to come and build that out, so that more organizations—and maybe me, in the future—don't have to spend all the money the board is going to give us in the first three or four years struggling to get past phase one, enabling CDOs to start creating value and optimizing the business functions," he says.

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