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THE LONG HAUL
KOTCH'S CONFIDENCE
TEAM PLAYER
MAN OF THE PEOPLE
MAN OF THE PEOPLE
TECHNOLOGICALLY IN-KLINED
A LEAP TO THE EDGE
CONTROLLED AGGRESSION
BACK INTO THE FRAY
RANDOM COLLISIONS
TIED TOGETHER
DYSON WON'T BACK DOWN
WOOD CUTTING
TAG TEAM
OUT OF AFRICA
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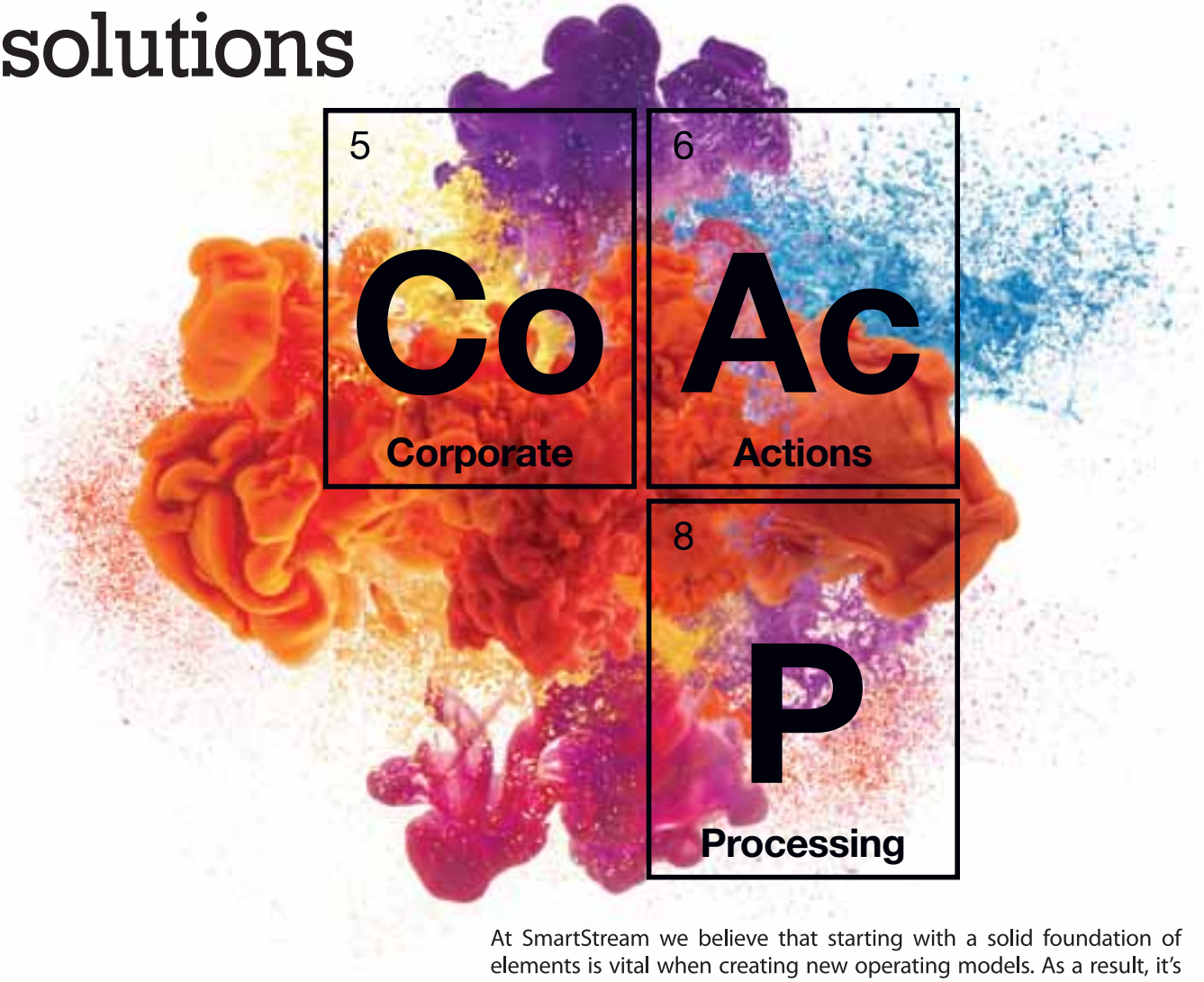

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Waters: 25 Years in the Making

Twenty-five years. A quarter of a century. Half my lifetime. However you express it, it's a long time. That is how long *Waters* has been in existence. Founded in the summer of 1993 by publisher Dennis Waters—hence the name—this publication has been around the block a few times. Just two issues were published in that first year—a summer and a winter edition—and paging through those two magazines, it's fair to conclude that 1993 wasn't a vintage year from a design perspective.

There have been highs and lows along the way, but none has come close to matching the events of the morning of September 11 in New York, the day when Risk Waters launched the inaugural Waters USA conference and fatefully chose to host it on the 106th floor of the North Tower of the World Trade Center. It was a day that would have started out with a mix of optimism and excitement for the 16 Risk Waters staff members—not to mention the 65 delegates—at Windows on the World that clear, bright morning, and ended in tragedy in what will surely come to be recognized as one of the most seminal days in human history, a line in the sand, a watershed when the world changed forever (*see page 20*).

Waters weathered that storm and under the direction of Ben Ray, now at Bloomberg, the brand grew significantly. Lee Hartt, one of Infopro Digital's current managing directors, took over where Ben left off, which loosely coincided with my appointment to editor. Now the title is under the steady hand of Katie Palisoul. Anthony Malakian in the New York office was a huge help to me as an advisor and sounding board during the early days of my editorship and continues to push the boundaries of fintech journalism, while other outstanding journalists I have had the pleasure of working alongside (and who *Waters* readers will no doubt remember), include Jake Thomases, Tim Bourgaize Murray and Dan DeFrancesco. More recently, James Rundle continues to drive and shape this magazine's editorial, while in Hong Kong, Wei-Shen Wong regularly pulls rabbits out of hats.

But there is another person who has helped me put more than 100 issues of this magazine to bed; someone who has been instrumental in our ability to consistently hit deadlines over the years; and someone who I consult regularly about this and that, who sprinkles what I refer to as her "fairy dust" all over our editorial: Elina Patler, subeditor of this great book. If ever there was someone worthy of the unsung hero epithet, it is she.

And so from all of us to all of you—our contributors, advisers, sources, clients, supporters, readers and even our critics—thank you helping to make *Waters* what it is. W

Victor Anderson
Editor-in-Chief

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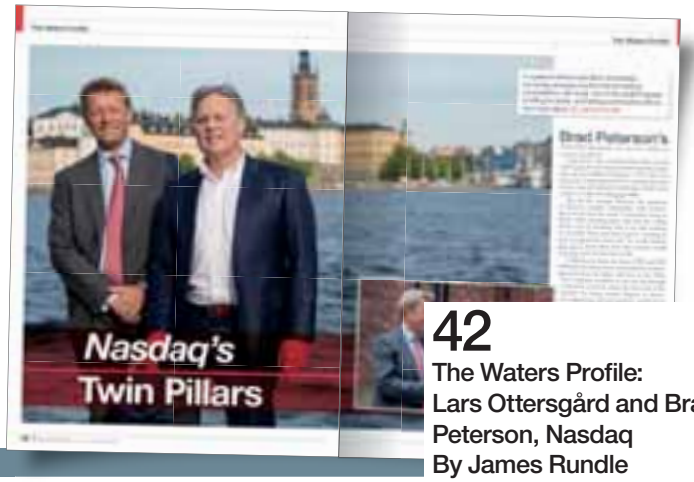

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The Opportunity Cost of Compliance Is Often Overlooked

With increasing regulatory requirements, many expect institutions to double regulatory spending in their attempts to remain compliant. Amid universal focus on satisfying regulators, according to COOs speaking at the Rimes II Client Conference, the industry needs to move opportunity cost up the agenda.

In this era of regulatory rollout, the cost of compliance is a ubiquitous topic of discussion within the finance industry. With a Duff & Phelps survey predicting that financial institutions' regulatory spending could more than double in the next five years, the compliance costs conversation is unlikely to quieten down anytime soon. However, according to two COOs, there is one cost that the industry could benefit from discussing more: opportunity cost.

"We all know there's a cost of implementation and a cost of running [compliance solutions]. But one of the costs that is hardly ever called out is the opportunity cost. We are deflecting a lot of resources—IT and operational resources—on to delivering regulatory change, and that is at the cost of actually investing that time within the business," said Lee Toms, global head of investment operations for Legal & General Investment Management (LGIM), at the Rimes II Client Conference held in London in May.

"Fundamentally, what we find as an in-house organization is that the people you're asking to do the regulatory change are the same people you would have trying to help and grow and diversify the business," Toms said, adding that this results in a "real resource cost constraint" as well as the opportunity cost.

Mike Tumilty, director of operations for Aberdeen Standard Investments, concurred. "The opportunity cost is really difficult, when you have a limited number of subject matter experts," he said, adding that all firms face those limitations. "To use those subject matter experts three or four times over—which is effectively what we are trying to do—to get into running these growth initiatives, integration initiatives and regulatory initiatives, is where the negative aspect is, on the people side."

Stumbling Blocks to Compliance

Toms said, with "regulatory changes coming along thick and fast," in addition to an evolving industry and client expectations, compliance is tricky for asset managers.

He said client demands are increasing, "but on the backdrop of that, there's pressure around fees and doing more for less, and then as an organization we're trying to keep up with the technological advancements that are taking place. So you're trying to service a growing, diversifying business as well as actually trying to change the business."

Ewan Scott, head of sales, EMEA and APAC for Rimes, also participated in the panel, adding that Rimes' approach is to help firms remove some of the regulatory pressure so they can focus on growth.

"One of the themes is how firms manage that balance between managing things like existing process and regulatory changes while still trying to get involved in some of the growth initiatives that are out there as well," Scott said. "Our perspective is talking about how we can take away some of the pains and what areas [firms] could potentially outsource, in terms of data and regulation in particular, to allow those firms to then focus on the areas that will let them grow their business."

Regulatory Opportunities

Tumilty has a positive outlook overall, however, and said the regulations create opportunities for the industry.

"I don't think it's all downside. Some of the regulations that have been introduced are absolutely essential post-global financial crisis to give regulators and monetary authorities visibility into things that were previously less transparent. But I do think there's an opportunity to standardize, harmonize and be consistent. And I think that extends to service providers and how they work together," he said.

For Tumilty's team, there is the additional challenge of integrating

Ewan Scott
Rimes

Lee Toms
Legal & General Investment Management (left)

Mike Tumilty
Aberdeen Standard Investments (right)

Aberdeen and Standard Life, following a merger in March 2017. He said the two organizations had very different approaches to transaction reporting; the integration has increased compliance costs in the short term as a result of operating on separate platforms, but they will generate operational efficiency out of the regulatory projects by moving to a single investment platform.

"The more you have your operating model in place, working well and efficiently, then you can minimize to an extent the ongoing running costs. But, ultimately, if you've got a fragmented operating model and you've been subject to multiple takeovers, mergers and acquisitions, trying to apply new regulations on top of that is really hard work and very expensive. So, for me, the cost has definitely gone up, but it's not all bad because there are opportunities to try and standardize and harmonize throughout that process," Tumilty said.

Data Strategy

Good data management may be the key, the panellists agreed, with Scott reporting: "We've definitely seen data taken far more seriously in buy-side firms over the last 10 years or so. This is one area where the word 'strategy' isn't overused. It is definitely a strategic goal of most firms to manage that data correctly because they know that enables the rest of their business, so it's something they take very seriously."

Toms said LGIM has been running a data program for approximately five years with a centralized, dedicated data team. Data is integral to every core program being built out across the organization while these programs build out LGIM's data capability.

"Pretty much every project that takes place, every new instrument that we use, every new client we take on, will feed back into data in one way or another. The way data is being built up is a real enabler for an organization," he said. "We haven't really touched on outsourcing but, to be perfectly honest, in terms of making a company more agile in partnering with new financial technology-type companies, having the ability to outsource—whether modular or wholesale—having strong data components and a really strong launch pad and landing pad, is actually key to driving business forward."

Tumilty said "the data strategy is absolutely integral" to devise a clear, operational strategy post-merger. Once a strategy is in place, he said, it enables firms to decide what they want to keep in-house and what they want to outsource.

"We spent tens of millions in the last four or five years, effectively building out our data infrastructure given the criticality of that to our investment decision-making processes. As a consequence of bringing together our new firms, we are embarking on a clear outsource strategy for things like performance measurement, which historically has tended to be in house, and it's just a re-plumbing of data," he said.

Tumilty added that Aberdeen Standard Investments looked at data end-to-end, including what extends to outsourced providers: "It can't stop at the boundary wall of the organization. The key thing is to bring all of that into a single place to verify it and then to pump it around the organization. Without that, it can be a bit like spaghetti junction."

Once that process is in place, he said his goal is to have "a single, clear, cohesive data strategy, single middle-office provider and then to transport that data into a single investment platform. From that will flow a lot of the well-publicized synergies that ultimately we expect to get, in terms of the merger." He added that, even if the merger wasn't a factor, that approach allows him to demonstrate "year on year the cost of operations," following the hefty investment in data strategy, and that Aberdeen Standard Investments is subsequently seeing costs decrease.

"That drives absolutely everything. It's not easy to get to, it will cost you a lot of money, and you have to go to the board and you've got to justify the business case, and they'll look at you like you're kind of crazy," Tumilty said. "But, once you've done it, I think from every pound, dollar or euro that is invested by our clients, more of it will drop to the bottom line than it would without a data strategy." **W**

SEC Still Reviewing CAT Deadlines

The Commission says it is open to providing leeway to broker-dealers if the CAT cannot accept some trade data. By Emilia David

The Securities and Exchange Commission (SEC) is continuing to review revised timelines for the Consolidated Audit Trail (CAT) but may limit enforcement if the system is not yet fully developed.

In a statement issued in late August, the SEC notes its division of trading and markets is still reviewing the master plan it requested from self-regulatory organizations (SROs)—the exchanges that will report into the CAT—that it received back in May. It also announced it may delay enforcement of reporting failures for large broker-dealers if the CAT is not fully developed to take in data on different trades.

The plan details new deadlines SROs and the CAT processor Thesys CAT need to meet, as well as the necessary steps to implement the database.

Under the master plan, SROs will report beginning November 15, 2018, followed by large broker-dealers a year after and small broker-dealers reporting in November 2022.

"The division is continuing to review the master plan," the statement reads. "The division and other SEC staff will continue to monitor the development of cybersecurity controls for the CAT and work with the SROs, Thesys, and the industry regarding the security of CAT data. "

Reporting to the CAT was meant to start in November last year but was met with delays around the hiring of a chief information security officer (CISO) by Thesys CAT to oversee security protocols. Thesys hired Vas Rajan as CISO in February this year.

The new master plan also breaks up reporting of different assets for broker-dealers. Firms begin equities reporting in November 2019 followed by simple options in May 2020. Customer and account information reporting is slated for November 2021.

"The division recognizes that it is not practicable for industry members to report some or all of the contemplated industry data to the CAT unless and until the CAT has been sufficiently developed to receive that data. The division also recognizes that the industry member reporting specifications are a prerequisite for industry member reporting," the SEC said. "Accordingly, and subject to the ongoing good faith efforts and cooperation of industry members to facilitate the development of the CAT as promptly as practicable, the division does not expect to make enforcement referrals concerning industry members for failure to report data to the CAT if the CAT is not sufficiently developed to receive that data."

The SROs announced in an August 5 update that user acceptance testing has begun and is on pace to meet the November deadline so far. Other technical issues are still being ironed out, including making the CAT format closer to current order audit trail system and determining possible alternatives to personal information that may be disclosed in a report.

Security of personally identifiable data as well as other information available on what is considered the largest financial information database in the world has been a concern by lawmakers. A bill preventing the CAT from ingesting this data was introduced in the House of Representatives earlier in 2018 but has not yet been discussed on the floor. W

WATERS RINGS THE NASDAQ CLOSING BELL

To celebrate the 25th anniversary of the magazine, *Waters* was invited to ring the closing bell at Nasdaq's Market Site, on August 13.

Our thanks goes to Nasdaq, *Waters* colleagues past and present, and *Risk.net* staff for attending.

Data Quality Poses Challenges for ESG-Conscious Investors

State Street Global Exchange's head of research says investors still struggle to measure ESG impact on their portfolios, despite growing demand for insights. By Amelia Axelsen

Meeting investor demand for environmental, social and governance (ESG)-focused investment products is being hampered by a lack of high-quality ESG data, despite better global company disclosures. That is according to Chirag Patel, head of research and advisory business in EMEA at State Street Global Exchange, the data and analytics arm of custodian State Street.

"The investor community is still struggling with the challenge of being able to understand what exposures exist in portfolios, taking the information about companies—either in the portfolio or companies in the universe of investment opportunities—into consideration when thinking about how to target certain ESG exposures, and what risk and return outcomes can be expected based on those characteristics," Patel says. "Simply, it is the inability to measure what's in their portfolio."

This problem is not only difficult because of fragmentation among data sources, which requires multiple data providers, but also because some of the data simply doesn't exist, he says. Although there is high-quality data for equities and corporate issuers, for example, there is very little data for private, illiquid assets, meaning that a multi-asset portfolio may only have partial coverage.

A 2017 study conducted by State Street's Center for Applied Research (CAR) found that 60 percent of investors note a lack of industry standards for measuring ESG performance as a significant barrier to full integration.

And despite a shift in regulatory direction on requiring listed firms to disclose ESG-related information, particularly in Europe, and growing investor demand, the industry is still falling short on ESG transparency, Patel says.

Chirag Patel
State Street
Global Exchange

"One thing that is driving this shift is multilateral efforts between the investor, the asset manager, and the regulatory communities—there's an effort between the sustainable accounting standards," he says. "When referencing disclosures, it's not enough for regulators to simply require companies to say 'Please report your carbon emissions,'—it's about introducing a uniform framework for measuring that. How one company assesses its carbon footprint may be very different from how its peers do, and there is perhaps too much room for variation in terms of interpretation."

Having a uniform metric that is quantifiable will ensure data is being collected. Material ESG metrics that are harder to measure, such as diversity, should be outlined in a prescriptive method to push companies to report this information, he says, adding that although some regulators have introduced new metrics, the lack of global standards will make it harder to achieve uniform, industry-wide standards.

"The problem is that you have fragmentation—high-quality data in some markets, and low-quality data in others—so based on the geographical focus of certain institutional investors, some may be better placed than others," Patel says. "Ultimately, when we think about the global universe of an investment opportunity, data is very fragmented."

Similar to geographical variations in data quality based on different regulatory jurisdictions, investors' appetite for investing in companies based on ESG-specific characteristics is based on societal norms in the places they live.

"We've seen a dramatic increase in the number of investors who care about it both from an investment decision-making perspective—sort of pre-trade fashion—but also in a post-trade fashion. Investors who do not necessarily actively incorporate ESG in their portfolios are still being asked by asset owners to report on these characteristics," Patel says.

Officials say a number of unnamed new clients have signed up to use ESGX, State Street's own hosted analytics tool that helps investors include ESG factors in their investment process, but even with such tools, the data challenge—especially in the alternative investment industry—is "substantial," Patel says.

"We as an industry have a ways to go before we get there, but perhaps the most meaningful step we could take—which would be the near-term goal—is self-disclosure from companies, and thorough regulatory or long-term mechanisms that allow investors to compare [ESG metrics from companies] across the world," he says. W

IBM Focuses on Qubit Quality for Quantum Computing Development

While IBM is set to open its 50-qubit prototype quantum computer to partners early next year, the key for the company is improving qubit fidelity. By Anthony Malakian

The textbook definition of quantum bits—or qubits—is that they are the fundamental units of information in a quantum computer, and have more than just the two states of zero and one. And should you read a quantum computing textbook, you would learn about how qubits work and how to construct circuits that perform various algorithms.

Bob Sutor, vice president of IBM Q strategy and ecosystem for IBM Research, says these textbooks explain how qubits last forever, do exactly what they're supposed to do, and that while there is a probabilistic aspect to quantum computing, everything behaves as expected in the textbook examples of qubits.

Unfortunately, in the actual physical world of quantum computing, that is rarely ever the case.

"Real qubits—ones that you actually build in hardware—are called physical qubits. These real devices run at close to absolute zero—15 millikelvin. There's a lot of instrumentation and infrastructure around refrigeration, around electronics. They're programmed using microwave pulses. They are really very physical and, as a result, actual qubits that you build have some errors associated with them and errors can enter in a number of different ways," Sutor tells *Waters*.

Over two years ago, IBM released, on the cloud, the IBM Q Experience, a small 5-qubit machine that allows people to go in and play with real hardware. "If you're going to talk about quantum computing today, you have to be talking about real hardware," rather than simulations, he says. In that time, over 94,000 individuals have conducted over 5 million experiments on the environment.

Bob Sutor
IBM Research

In late 2017, IBM released a commercial network called the IBM Q Network, where "the best and the latest machines will live," Sutor said, and they will be available to partners, such as current ones like JPMorgan and Barclays. The Q Network currently has access to 20-qubit systems, and will have access to 50-qubit prototypes, which will be available early next year, he said.

Sutor said the total number of qubits is not what's most important at this stage of development. Rather, the key is having enough "really good" qubits. This means two things: first, that the error rates on the actual physical construction of the qubits are low enough so that you can take them into account. Then there's the coherence time, which, for a physical qubit, is how long you have before it deteriorates and becomes chaotic or wonky.

The coherence time limits how much experimentation or how many tasks can be conducted. The aim for IBM Q is to improve the quality of the individual qubits, rather than expand the number of qubits.

"The work we are doing this year is very much focused on improving the quality—what we call the fidelity—of the qubits. This is not a year, to be honest, where how many qubits anybody has is so important," he says. "It really comes down to saying, 'Are we making significant improvements in the quality of the qubits so that we can do more and better computations?' Once we're comfortable with that, then we'll increase the number of qubits."

So IBM is not in as much of a rush to increase the number of qubits as it is to improve the quality of the qubits, answer the engineering questions, make improvements, and only then release additional qubits. Sutor says it is a process and racing to an arbitrary number of qubits is not how this space will be developed.

"The number of qubits is not going to grow [in 2018] and I'll tell you that having 1,000 or 2,000 or 4,000 really lousy qubits is not better than having 50 really good qubits. So much of the focus at the core of what we're doing with regard to actual quantum computing is related to quality and fidelity," he says. "Aside from that, programmatically, I'm very interested in growing the ecosystem this year. I'm very interested in having as many universities as possible start to teach quantum computing, and, of course, [we have] 94,000 users [experimenting with IBM's quantum computer]. I'd love to double or triple or quadruple that. I want to get people in there who really use actual quantum computers. That will put everything on a good course to greater use and understanding." W

Traders Urge Caution on Potential Bitcoin ETFs

Senior industry figures say it may be too soon to create financial products based on cryptocurrencies. By Josephine Gallagher

The digital arms race around bringing institutional-grade products and tools to bear in cryptocurrencies continues to gain momentum, but the very people needed to create a bona fide asset class in bitcoin are urging a slower pace.

There have been significant steps taken in recent months to breathe confidence into the digital space—with SIX Swiss Exchange set to launch a cryptocurrency platform designed to provide trading, settlement and custodial services, and VanEck teaming up with SolidX to file its third bid to list a physically backed bitcoin exchange-traded fund (ETF).

These latest movements, however, have still failed to alleviate industry concerns relating to crypto ETFs, with some of the key issues involving security, anti-money laundering (AML) and know your customer protocols.

"One thing I'll tell you that has to get fixed before this is going to be a true, viable means of currency, and thus [suitable for] building financial products around it, is the safety," says Steve Sachs, managing director and head of global markets at Goldman Sachs Asset Management. "We can't keep waking up in the morning and having news headlines around another $150 million or $400 million hacking and theft of cryptocurrency. That problem has to get solved."

The US Securities and Exchange Commission (SEC) is expected to take eight months to conduct a thorough analysis of VanEck and SolidX's application to list a bitcoin ETF on Cboe Global Markets' exchange, which focuses on areas such as liquidity, price evaluation, and customer protection.

Mark Fitzgerald
Vanguard

The concept of bitcoin ETFs is intended to provide institutional investors with exposure to cryptocurrency prices at a fraction of the risk. VanEck has said it will offer insurance services for its bitcoin ETF against incidents such as theft, hacking, loss or destruction, but ETF experts have called this provision into question.

Exchange-traded products in bitcoin have been around for several years in Europe. In April 2015, Nasdaq Stockholm listed the Bitcoin Tracker One, the very first bitcoin-based exchange-traded note (ETN), and earlier this year, France announced steps to create a legal framework for digital currencies. Despite Cboe and the Chicago Mercantile Exchange launching futures on bitcoin in late 2017, the US has yet to approve an ETF on its domestic exchanges.

Part of this is due to the bifurcation in US regulatory structure. The futures contracts are overseen by its sister regulator, the Commodity Futures Trading Commission, which also claims jurisdiction over bitcoin after it determined the cryptocurrency was a commodity. The SEC, however, has broad jurisdiction over listed products such as ETFs, and has continually demonstrated a more cautious approach to certifying these applications, despite a senior SEC official saying that bitcoin and ether on their own did not qualify as securities earlier this year.

"The regulator in the US is very concerned about this [crypto products], as are regulators in many countries," says Deborah Fuhr, managing partner and co-founder at ETGFI, an independent research and consultancy firm. "There are concerns about pricing of the cryptos, there's concern about their use for money laundering and there's been an increasing number of requests to create crypto products but so far the regulators have not allowed this to happen."

Now as regulators remain tight-lipped on the prospect of a new wave of digital products, many major institutions remain skeptical of their value. In January, Nordea banned employees from owning or trading cryptocurrencies and has urged regulators to take more immediate action, while other heavyweight firms such as Vanguard caution investors on digital investments. Chief executives from major buy and sell sides have also labeled bitcoin as a "fraud" in recent years, although markets were sent sharply up last week on reports that BlackRock had established a working group to explore how it can engage with cryptocurrencies, perhaps signaling a softening of attitudes.

Still, many remain unconvinced about the material benefits of bitcoin, either as a tradable product or a store of value. "It's wise to invest in assets that have an intrinsic value that you can understand and that actually will offer a diversifier of idiosyncratic risk, and in the long term provide real positive net returns—[for example] they'll actually be increasing your wealth over the long term, because that's typically what people invest in," says Mark Fitzgerald, head of ETF product management, Europe at Vanguard. "I'm not sure you can say that of the current batch of cryptocurrencies, because it's not apparent that they have any intrinsic wealth or ability to provide a real net return over the long term." W

London Stock Exchange Readies Netherlands Base for Turquoise

Identifier codes for Turquoise have been registered ahead of a potential hard Brexit in 2019. By Hamad Ali and James Rundle

The London Stock Exchange Group (LSEG) has registered market identifier codes (MICs) in the Netherlands for its Turquoise trading venue, in the lead-up to Britain leaving the European Union in 2019.

Turquoise offers 4,500 stocks with uniform access to 19 major European markets. The multilateral trading facility is majority owned by the LSEG, in partnership with 12 banks.

The MICs were published in August's monthly release. MICs are issued to exchanges, systematic internalizers (SIs), reporting platforms and other trading venues, such as dark pools and multilateral trading facilities (MTFs). They are administered by the ISO 10383 Registration Authority, and are a universal identifier code designed to facilitate automated processing.

Spokespeople for the LSEG, which had previously confirmed to *Reuters* that it was selecting the Netherlands as a base from which to serve clients in the EU27—the remaining members of the bloc following the UK's departure—declined to comment. It was reported that Turquoise, TradEcho, and UnaVista had applied for additional licenses as part of the LSEG's contingency plan for a possible hard Brexit.

Banks, brokers, exchange operators and technology providers are becoming increasingly concerned that negotiations for some form of trade deal between the EU and the UK may fail, resulting in a so-called "hard Brexit." Under this outcome, businesses based in the UK will be unable to freely export their services into the EU, as the country will lose its "passport" to the Single Market.

While a hard Brexit was once seen as a political negotiation tool, it has grown increasingly likely over recent negotiation rounds between the UK and EU, not least of all thanks to a degree of political instability within the UK government that saw Prime Minister Theresa May forced to take direct control of negotiations, following the resignations of Boris Johnson, the UK's foreign secretary, and David Davis, the head of the department for exiting the EU.

"Perhaps this is simply a classic political ploy of expectation management," said Murray Gunn, head of global research at Elliot Wave International, in a note to clients at the end of August. "Tell everyone to prepare for the worst and then, when a deal is done, take the plaudits and credit. Perhaps. Then again, with 'Quitaly' looking more likely by the week, the EU will be in no mood whatsoever to grant any concessions to the UK for fear of providing fuel to secessionists. A 'no-deal Brexit' remains a firm possibility."

Therefore, many are beginning to make concrete preparations to serve European customers from within the Eurozone, the collection of EU nations that use the single currency. Bloomberg, MarketAxess, Cboe Global Markets and others have all announced plans to seek authorization to operate in the Netherlands and have registered MICs to that end. Other popular destinations include Dublin, in which the Depository Trust and Clearing Corp. recently announced it would open facilities, as well as Frankfurt, Luxembourg and Paris.

The Chicago Mercantile Exchange Group has said it will retain its London headquarters, but through its upcoming acquisition of NEX Group, it will also gain access to the firm's operations in the Netherlands, Italy and elsewhere.

The LSEG's structure is somewhat different to other providers. While it operates the UK's primary market, from which it draws its name, in the UK, it also operates Borsa Italiana and its clearinghouse, CC&G, along with the fixed-income platform MTS, which is based in Milan. Through its majority ownership of LCH, it also has an existing presence in Paris.

Turquoise, however, is firmly based in London, and will require a European presence in order to continue to serve EU clients in a relatively frictionless manner. W

Blackstone Outlines Blueprint for Thomson Reuters F&R Spin-Off, Refinitiv

Blackstone executive Martin Brand describes some of the areas where it plans to invest once Thomson Reuters' Financial & Risk unit is spun off later this year. By Max Bowie

Thomson Reuters may have only just announced Refinitiv as the new brand for its Financial & Risk unit once the business spins off from its parent later this year in a $20 billion deal with a consortium of investors led by private equity firm Blackstone Group, but the new owners already have plans for leveraging F&R's assets and combining them with other assets owned by Blackstone.

In fact, these plans have been in development for some five years, when Blackstone first looked at buying the business, but "couldn't really make the math work," says Martin Brand, senior managing director in Blackstone's private equity business, in a podcast describing the deal. "We revisited the idea in 2016, and at that time, it was clear that this would need to be a corporate partnership, so we really focused on developing the thesis: How would this business be better in partnership with Blackstone?"

After a significant number of meetings with the industry to develop this thesis, "the more we delved into this, the more our conviction grew," Brand says. "We thought, 'We can really make it a better business.' We thought, 'If it's partnered with Blackstone, we can help with clients on the sell side, we can help with clients on the buy side, we can help them on the business side, and we thought we could drive some efficiencies in the business and help with M&A. We identified areas to invest in and accelerate growth."

Then, a year ago, Blackstone held its first discussions with Thomson Reuters executives, who "bought in" to the thesis, then ran its commercial due diligence in the fourth quarter of last year. "At that point, we started focusing on the contract, and it was about a month-long negotiation, where we were basically holed up in a law office," hammering out agreements for every part of the business that would be included in—or excluded from, in the case of Reuters News, which Thomson Reuters will retain but lease to Refinitiv under a long-term contract—the deal.

Brand says the deal reflects the growing importance of big data. "We believe that as machine learning will increasingly replace human business processes, data is going to be an extremely valuable commodity. But data needs to be efficiently ingested, it needs to be distributed, it needs to be classified so you can find what you're looking for—and those are areas where F&R is a market leader. We see [the need for] it in some of our portfolio companies which have valuable data but don't necessarily know how to distribute these, so there could be a synergy there," he says. "Blackstone has made a significant investment in data. We believe alternative data is a fast-growing segment, and so our thesis within this particular investment, of course, is to be innovative, become a market leader—to the extent that we aren't already—and invest behind this. And the fact that machine learning, artificial intelligence, and big data are tailwinds for us makes this an even more attractive investment."

And contrary to industry speculation that Blackstone would seek to offload the Eikon terminal business, Brand says the firm is "excited" about investing in this space. "The most difficult time is really behind that business," he says, adding that the migration of legacy terminals to Eikon is 85 percent complete. "So the future, I think, is much better than the difficult period they had in the past. And we also discussed several add-ons for Eikon that we believe will significantly strengthen the value proposition."

Brand also cites the vendor's Risk & Compliance business line and its assets such as Starmine and Lipper. "The key overall is that with the transaction, we'll accelerate the pace of investment and focus to allow the business to pick up its growth rate," he says.

Blackstone was unable to make officials available to elaborate on Brand's comments by press time. W


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CTO Bill Murphy hones technology to support Blackstone's diversification
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Wells Fargo's Steve Ellis breaks the mold, then sets the pieces on fire
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Reviewing the Past 25 Years in Financial Tech

Waters looks back at some of the key developments in financial-market technology, and key events, over the course of our 25 years of coverage, from the birth of electronic trading through to the rise of fintech.
By Tim Bourgaize Murray

Even—perhaps especially—in an industry where you're only as good as your last trade, 25 years is a long time. Few publications can claim to have been around for the quarter-century that has seen some of the greatest upheaval in history for financial-market technology, and as we celebrate our 25th anniversary this issue, *Waters* looks back on time of the key points along the journey.

From the rise of electronic and high-speed trading, through the development of cloud, and risk management coming of age, to now, where we are perhaps entering the age of artificial intelligence, we would like to thank our readers, past and present. We hope you will join us for the next 25 years. W

Regulation: The Shaping of an Industry

Regulation's influence on financial technology, and indeed on *Waters*, is profound. Consider that the Glass–Steagall Act was 60 years old and still law when the magazine was founded. After its repeal in 1999, the Commodity Futures Modernization Act calamitously declined to regulate swaps in 2000. Dodd–Frank and its roughly 2,300 pages saw to that, opening entirely new fronts for innovation. Meanwhile, Reg NMS laid out the groundwork for market data as we know it today. Equities dark pools, authorized by Reg ATS, brought a new wrinkle to electronic trading. Regulators have taken on big, spirited projects of their own, like the Consolidated Audit Trail (CAT), at times with half-hearted regret. And reporting only gets more ambitious: Europe has taken that baton today

with the far-reaching implications of the revised Markets in Financial Instruments Directive.

From the very beginning, regulation has proven a boon to fintech. By breaking down Glass–Steagall barriers, regulators gave a push to banks in the US, prompting their transformation into technology powerhouses. Of course, where only the leverage went and not the transparency, global markets froze up in 2008 in a way that would have seemed unimaginable 25 years earlier. Almost as suddenly, every tech provider—and even tech reporter—became a regulation expert, and remains so today.

> "With technology, today there are many examples today of a regulator and industry working together."
> **Tom Sporkin, BuckleySandler**

Even in quieter times, rulemaking choices have built up, broken down, and re-engineered markets with consequences for liquidity, no small amount of controversy, and openings for fast-moving tech. Today, regulatory standards increasingly shape how firms share, govern, commoditize and even "forget" their data. And in the post-crisis era—one marked by constrained capital, fraudsters, rate scandals and billion-dollar fines—regulators now use tech to drive their own enforcement actions, as well.

"With technology, today there are many examples today of a regulator and industry working together," says Tom Sporkin, a partner at law firm BuckleySandler and a former senior official at the US Securities and Exchange Commission (SEC). "For illustration, look at the CAT. While we know the CAT will revolutionize the future of market surveillance, inform SEC rule writing, and insider trading investigations, the more interesting aspect may be the advancements the industry makes with access to order data infinitely more complex than ever imagined."

Indeed, technology's relationship with regulation is innately dualistic, and never more so than today. This will only continue.

The Crisis: A Formative Moment

Aside from the hell of 9/11, arguably the most formative journalistic event to pass through *Waters*' pages came several years later, in the subprime mortgage crisis, credit crunch, sell-offs, and subsequent global financial catastrophe of 2008.

It was less a crisis than a slow-motion tumult—one so destructive that even 10 years later, it remains a daily frame of reference. Of course, its wide-ranging impacts, both within and beyond institutional finance, are still being felt, too. But the events of 2008, their confused aftermath and the interregnum leading to today's more "stable" markets left an indelible mark on technology—even if you put the years of Dodd–Frank drama aside.

Take a cinematic example from *Margin Call*, which stylized the lead-up to the October sell-off. In an early scene, a young quant uses scenario analysis from his recently fired boss to model the value-at-risk across their firm's asset-backed securities desk. The results, unsurprisingly, aren't good and send into motion the rest of the film. But the greater surprise? The models are all on a USB stick. Chances are today, this back-testing would sit on a sophisticated cross-functional platform, spun-up on hosted infrastructure, and—regulators may not want to hear this—be analyzing credit valuation adjustments and even more exotic methods deployed by traders to lever up. In short, the crisis institutionalized risk technology. After the downfall of Bear Stearns and Lehman Brothers, and massive losses everywhere else, there wasn't much of a choice.

> "Post-crisis regulation reinforced trends under way."
> **Susan Estes, OpenDoor**

"Post-crisis regulation reinforced several trends already under way in fixed income: concentration of market share among the top of the primary dealers, de-emphasis of proprietary risk-taking in favor of increasing electronic market making, and reductions in balance sheet allocated to 'commodity' business lines," explains OpenDoor Trading's CEO, Susan Estes.

As analysts nervously consider the possibility of another downturn today, the question remains over whether enough lessons have been learned.

Electronification: Welcome to the Revolution

Electronic trading is *Waters*' bread and butter—and that is an understatement. Yet, outcomes remain uneven. The last 25 years have witnessed an ever-more creative race to near-zero latency in liquid markets. Deploying everything from FPGAs to microwaves to hot-air balloons in the drive to shave off microseconds, this race has also seen some of the most expensive per-square-foot real estate in the world found on northern New Jersey swampland inside exchange operators' data centers, or suburbs that cling to the Chicago metropolitan area by their fingernails. The veritable cottage industry of high-frequency traders does not lack for juicy stories and entertainment that is innovative, bizarre, stubborn and at times even preposterous. But in its quest, it has also served to push proprietary trading really into a realm all of its own—with black boxes so fast, and algorithms so good, that slower flow doesn't stand a chance. Even the modern speed demons of fiber-optic cables are finding an upper limit to their endeavors, as shops close up or become absorbed by rivals across the world.

Meanwhile, the state of play in credit and fixed income remains broadly at the opposite extreme. In these markets electronification and price transparency have been slow to arrive—and for more illiquid instruments, they haven't yet at all.

> "Electronification of fixed-income trading has not yet revolutionized the way asset managers trade."
> **Michael O'Brien, Eaton Vance**

Call it a history of fits and starts. "Electronification of fixed income trading has not yet revolutionized the way asset managers trade," says Michael O'Brien, head of trading at Eaton Vance. "Electronification over the past few years has largely meant more efficiently replicating traditional phone execution."

Perhaps the most curious thing is what both groups of asset classes have in common. Even in an era of equities electronification, institutional investors still say they lack actionable, pre-trade transaction-cost analysis. For multi-leg trades and hedgers, shops are investing with partners to devise execution strategies that act almost as defensive maneuvers. It remains a paradoxical fact of life that the easier a market becomes to trade, the easier it becomes to be picked off. At times, many may sympathize with that old standby trader, slouched in the pit on the Chicago Mercantile Exchange's last day of open outcry.

Electronification is great. But when you lose, the old ways still feel like the best ways—regardless of whether they actually were.

Cloud: Revolution-as-a-Service

For junior *Waters* reporters, it was a running joke: Your first news story is inevitably a cloud story; your first headline pun is unavoidably "rainy" or "stormy." Of course, this was well before Amazon Web Services helped make Jeff Bezos into a $132 billion man and before every IBM commercial featured the phrase "in the cloud," almost as if it were state-mandated. The advantages of scalability and pennies-on-the-dollar cost reduction is where cloud made its fame. Credit where credit is due: Most of the push into the cloud-based as-a-service model (SaaS, IaaS, and so forth) in financial services was initially and, even in the face of early opposition, steadfastly vendor-driven. At first, it was also obsessively focused on the hardware side. But to look back on *Waters*' coverage of the subject, one could argue that the eventual acceptance of cloud was owed to something more conceptual, in that it wasn't the economics, alone. In part, this sea change had to do with proving what cloud can do on a computational basis—what it can do better, as well as cheaper. "The power of emerging technology today can bring immense value to a business, but can only do so with the computational power, storage, and complex analysis that can be provided by the cloud," says Synechron CEO Faisal Husain. "Another benefit is of course lowering operating expenses and creating more scalability as a larger part of legacy infrastructure modernization and digital transformation initiatives."

The other flashpoint came in 2012, when Hurricane Sandy directly hit the New York area, causing $70 billion in damage. Many operations chiefs and technologists took the opportunity to evaluate their business continuity processes (BCP), reorganize them, or bask in the smart choices they had made prior thereto. For those affected who got it right, there was one commonality: besides a little bit of luck, they and their BCP providers were early adopters of the cloud. Philosophically, few could object to that over pumping river water from their lobbies.

> "Emerging tech can bring immense value."
> **Faisal Husein, Synechron**

Added to that, it turned out that the emerging providers weren't just good at security and reslience—they were better than the banks. From there, it was an easy sell, and inn just a few years, cloud has become the conventional wisdom. Few innovations have proven—or will prove, in the future—so influential.

Algos: Kingmakers and Troublemakers

Sidewinder. Work and Pounce. Sumo. The names of algorithms are an invitation to anthropomorphize them—and ever since 2004, when this "relatively new" concept first began regularly showing up in *Waters*' coverage of "cyber-trading," they have been an unfailing curiosity for the magazine.

That curiosity splits two ways. First, there might be no more important sell-side execution offering today than the algo wheel, and no more greater influence on execution across a number of asset classes. Second, algos—even terrific algos—and their makers must suffer the same struggle for survival as human traders. Just ask the owners of those mentioned above: Instinet, Lehman Brothers, and Knight Capital.

One could say that algorithms are a natural outgrowth of electronification and low-latency trading—that may be so, but it's much like building a beautiful Formula One racetrack and letting it sit empty. You still need the souped-up cars. To look across the evolution of algorithmic trading, one finds key patterns and debates that have shaped trading today: norms around different types of trading behaviors that algos should mimic (i.e. Sweeping, Vol, TWAP and VWAP); distinctions between lit and dark trading that have modulated over time; measurements of best execution, including required data; and effective block trading—the rise of algos had a part to play in all of these. Over time, they have played a parallel role in killing certain trends, as well—complex-event processing, anyone?

> Unfortunately, it only takes the mere hint of an error in the market and the algorithms can pile on with cascading, and catastrophic, effect.

This lead role doesn't always go so swimmingly for algos, though. And sometimes, the failure is calamitous. The 36-minute long, trillion-dollar Flash Crash in 2010; the disastrous collapse of aforementioned Knight Capital; and numerous smaller glitches all prove that algos are troublemakers, too. The contour of these events speaks to a little-acknowledged fact, in that generally, the majority of algos are well-behaved and not particularly sophisticated, they are blunt instruments, and simply do what they are designed to do. If this, then that, essentially. Unfortunately, it only takes the mere hint of an error in the market (typically born of lazy coding or pre-production testing) and they pile on with cascading and at times, catastrophic, effect.

Though watchdogs have made far more of an effort in recent years, and for all of the benefits algos have ushered in—as well as the winners they have made—there is still much to learn, and perhaps regulate.

Crossing Over: Hybrid Platforms' Gambits and Flops

The philosopher Thomas Kuhn famously argued that scientific revolutions emerge from crisis. It is probably natural that fintech systems evolve in the same way. As historical boundaries give way to shifts in functionality and hybridization, the fintech provider community is responding to a collective need. It is sociological, like Kuhn thought, as much as technical.

These shifts don't happen cleanly, of course, and neither has the emergence of hybrid systems crossovers in recent years. They take on a life of their own. Take the most obvious: the order and execution management system (OEMS). For many, an OEMS—which would align order generation, execution algorithms and risk-check analytics, presumably with benefits of speed, workflow efficiency and user experience—is a kind of Holy Grail. The industry has pursued some version of it for at least a decade, and the closest successes have grown organically from one species or the other, rather than started from scratch. Yet oddly, many in this space don't shout "OEMS" from the rooftops; It is a kind of an unspoken rule for a lukewarm revolution—something several doomed startup entrants have learned.

> "We have seen the trend of crossover OEMSs merging."
> Michael Blum, Goldman Sachs

As one *Waters* staff editorial deftly summed it up in 2008, "EMS and OMS convergence? Not so much."

That mostly remains true 10 years later, though as Goldman Sachs CTO Michael Blum says, it is certain to remain an objective as well. "Banks have pushed more toward quantitative fund clients and increasingly sought to bring multi-asset trading platforms to bear," Blum says. "As a result, we have seen the trend of crossover OEMSs merging together, as clients seek to move closer to the point of execution. They are picking and choosing access points to banks' liquidity depending on those needs, and so you can't have the hops from OMS to EMS or other infrastructure. Ultimately that should promise more systems convergence going forward."

The OEMS is a hybrid many could secretly use, but few will vocally embrace. Such is life in the clunky business of evolution.

Data Makes the C-Suite

A range of external forces like trade electronification and regulatory pressures have shaped the availability (and limits) of market data and reporting data over the years. But much has changed with respect to the internal organization of data, too. The C-level priority assigned to that data has followed suit.

More recently, data executives have had to cope with post-crisis regulatory requirements—and for that matter, shareholder inquiries—that ask fresh questions of firms' data, demanding aggregation capabilities and governance frameworks on a wider scale than ever before. That was the initial genesis of the chief data officer (CDO) trend that took hold in the middle part of this decade. After all, informational availability (or lack thereof) had been painfully exposed during the crisis, and given that reengineering data processes is notoriously tedious, not every CTO or CIO is in the data weeds enough—or, for that matter, has the desire—to take the lead. Call it a CDO or something slightly different, this was a person specializing in bringing order to particular points of chaos. It also included many large firms on the buy side that had never experienced these kinds of requirements.

But one of the reasons why the CDO role remains a tumultuous, and fascinating, one is that it almost immediately took on a whole new bent with the explosion of new data sources and data exhaust, technologies to capture and exploit those, and applications built around them. In an unfair twist, today's high priority upon data usage has tested the frameworks developed by CDOs almost before they are put into place. In 2018 the role still requires the same powers of institutional persuasion and ship-steering as before, but far more emphasis on data science, partnering startups and

> "The CDO, or head of data management, has become one of the most strategic roles."
> **Brian Buzzelli, Acadian Asset Management**

even borrowing elements from data-forward industries. It's part master tactician, part magician—a tricky mix many CDOs continue to try and balance. This much is certain: EDM was once a plodding, steady-handed concept. Today, the stakes are raised, and it's not for the faint of heart.

"Data definition, quality validation and disciplined data management operations are imperative to ongoing success in our industry," says Brian Buzzelli, senior vice president and head of data governance at Acadian Asset Management. "The CDO or head of data management has become one of the most strategic roles. Just like data, the data leadership role requires a multi-faceted set of business and technical skills and now touches every function driving data manufacturing."

Into the Breach

Few developments make technologists pine for the days of stock tickers and settlement by paper certificate. Cyber is surely one of them, and perhaps no trend has spread so quickly in recent years as bulking up the security fences.

Information-security concerns aren't new, particularly in financial services, where protecting the identities of clients and counterparties has always been paramount. As chief information security officers (CISOs) have told us, it's a question of magnitude, risk-rating data protection measures and above all, raising human beings' own awareness.

Waters first began reporting in earnest on the rise of CISOs in 2013, and like many trends, our attention was earned at an ex-finance inflection point: the Target breach that saw millions of US consumers' credit card information scraped by malware. Five years later, the core issues for cyber posture remain essentially unchanged: resource allocation and cascading defenses; using artificial intelligence to up intrusion detection; better education and simulations; and more due diligence on any third parties plugged into the stack.

"It's satisfying to see the role of CISO elevated today to a senior management business function, as opposed to strictly IT," says Bob Ganim, CISO at Mizuho Americas. "CISOs need to fully understand the business, outside business environment, regulatory landscape, technology used, threat landscape, security controls needed, and the organization's risk appetite. This is why the role is moving, in many cases, from reporting to the CIO, to reporting to the chief risk officer or others in the C-suite. It is an integral part of the management team. And it's become a fairly collegial network, with CISOs sharing information."

Sure, like their ancestors in the 20th century, most hackers are rational and have an endgame. But not every cybercriminal is interested in a theft or ransom; some just want to impress themselves and take a system down. On a state level, the motives can be far more sinister. The stakes are appropriately high—for large organizations, a few hours' disruption alone could cost tens of millions in missed trading and market opportunities, even apart from potential data loss. For smaller ones, it's no hyperbole to call the threat existential.

> "It's satisfying to see the role of CISO elevated."
> **Bob Ganim, Mizuho**

"A single firm may not observe a cyber threat pattern," concludes Ganim. "But together, we can."

Alt Data: Signals and Chimeras

It was not so long ago that trading on trending social media was novel, and data drawn from sensors on natural gas pipelines or satellite imagery of big-box store parking lots was considered newfangled. In addition to fundamentals and technical factors, today's stock-pickers are apt to use a mix of these kinds of inputs before taking a position or putting on an option. The same can be said for data delivery: For example, sentiment scoring and analysis—drawing on natural-language processing (NLP) that can summarize positive or negative feedback from news in milliseconds—has proven an invaluable tool to quickly realize the value in alt data feeds.

Innovation on both ends has helped to bring this information—much of it already out there, if unruly and hard to verify—into the mainstream. When deployed effectively, it can absolutely be an edge. "Today the race is on to figure out the most effective way to combine the best aspects of fundamental and systematic investing," as Balyasny Asset Management's CDO, Carson Boneck, puts it. "It's an extremely complex problem, and data and technology are the linchpins. We believe that firms that invest in the infrastructure, machinery and emerging technologies to harness data at scale will win."

> "We believe that firms that invest in the infrastructure and emerging tech will win."
> **Carson Boneck, Balyasny Asset Management**

In fact, the last 25 years have already taught a few object lessons in alt data, as well. For one thing, frankly, it is far from a sure thing. This data needs context, historicization, and backtesting to be proven out and worthy of portfolio management decisions on its own; even measuring that reliability remains more art and skill than science. Ironically, as more and more of it becomes available, predictive and trustworthy, the alpha also decays, as well. So a sense of tension will frequently exist between actioning this data quickly and being reasonably certain about it. That's led to a growing graveyard of Twitter-based hedge funds and other gambits that went all in on alternative sources, too soon, only to see their secret sauce ultimately fail swiftly and spectacularly. Sometimes alt data is signal, other times chimera.

For another thing, more from the vendor perspective, building and monetizing an alt dataset is far from straightforward, for startups and large investment banks that can glean a ton of it from their retail banking and lending arms alike. Acquiring alt data, running it through the proper analytics for validation or usability, and delivering it while still fresh—this is neither a cheap investment, nor an easy one.

With all this in mind, and despite huge potential, experience shows that, for now, alt data is better regarded (and built) for its potential as a special kind of jet fuel, rather than the jet itself.

Risk: Swimming Among Black Swans

Even 10 years on, the residue of 2008 lives on at many institutions, and in financial technology. It would be a fallacy—or in the very least, incomplete—to say that risk managers were asleep on the job in the lead-up to the crisis. Rather, that tumultuous period exposed how little they were empowered institutionally, how poorly data was shared across desks, and perhaps to some extent, a lack of the technical capacity required to be creative about evaluating crisis scenarios and extreme, so-called "black swan" events. While far from perfect, today's risk management function has seen renewed emphasis and investment in each of these areas, and much of that is driven by improvements in technology.

Once seen as ancillary roles that inhibited profit-making staff, chief risk officers (CROs) are now plugged in and running their own teams, interfacing with portfolio managers and the CIO on the buy side, and sitting as equals in sell-side boardrooms. The platforms risk data sits on are increasingly agnostic to coding language and architectural orientation, allowing new risk protocols to be developed and delivered more quickly, and aligning current risk metrics across desks in real time. Finally,

> "AI allows us to ask questions that humans never imagined."
> **Jeff Shen, BlackRock**

recent leaps in artificial intelligence like deep-learning techniques allow firms to examine new paradigms beyond value-at-risk, and test pricing methodologies that would have never been imagined a decade earlier. Perhaps apart from trading, few areas have seen the kind of comprehensive forward momentum risk tech has attracted, and rightfully so.

"Artificial intelligence allows us to ask questions that humans never imagined asking before," explains Jeff Shen, BlackRock's co-CIO of active equity and co-head of systematic active equity. "Historically, fundamental investing focused on developing a deep understanding of individual companies, while quantitative investing sought a baseline understanding across several companies. With artificial intelligence, it is now increasingly possible to see both breadth and depth—taking you from a view of the forest to a view of an individual tree."

Fintech(s): New Look, Old Objectives?

Financial services has long been an obvious mark for Silicon Valley-style disruption, following in the wake of numerous other industries with incumbents perceived as slow and analog. Enter fintech, a curious word for a new breed of startup working in financial technology that eschew traditional Wall Street norms, with a skill at pretending they're a new breed of tech firm, even though the Fidessas and SS&Cs of the world might beg to disagree. Despite bold claims that they would replace banks, and although a few unicorns have come through along the way, progress thus far been uneven—Citi and Wells Fargo haven't exactly gone the way of Blockbuster and Sears. And that's okay. There are obvious positives: Asset managers deploying technology originally built for robo-advisors elsewhere in their operations is one example; solving certain complex post-trade calculations, like adoption of new portfolio compression tools, another. And the real potential of artificial intelligence and distributed ledgers is finally catching up with their respective hype cycles. In a few short years, the story could be very different.

Still, in 2018 it is fair to say that fintechs for capital markets are, on the whole, still surviving their early days. After the space really heated up, things have steadied. For aspiring technologists and entrepreneurs alike, it's an interesting moment to make a plan, or to make an exit: do you want to be a PayPal, or an Advent Software, or a Bloomberg? The former gained its founders fame; the next simply became famously good and later

> "The talent we all need is the ability to be entrepreneurial, agile and creative."
> **William Murphy, Blackstone Group**

acquired for an eye-watering sum, and we all know what became of the last guy and his terminal. Either way, there's no shortage of old problems to solve. And thankfully, those problems have a newish—some might even say sexy—label.

"Today, innovation is a constant force," says Blackstone Group CTO William Murphy. "The world is moving so fast and becoming so complicated that the only way to stay safe and current is to embrace systems throughout the firm's workflow. Even the old school parts of financial services firms are being transformed by fintech startups or disruptive technologies developed internally, pushing the boundaries on the change the business can handle. The talent we all need is the ability to be entrepreneurial, agile and creative—able to take on new information rapidly and create new products to add value for clients faster than ever before."

Lust for Ledgers

After an early and fitful period of detaching from the stigma of bitcoin (which has gotten its own, even more belated rehabilitation since then) distributed ledgers may well prove be the biggest game-changers in *Waters*' first 25 years. They have brought out superlatives from many corners of the industry that have, at times, bordered on the Messianic. But for the magazine, which has long adopted a position of skepticism on the wilder claims of blockchain evangelists, what makes the blockchain story so compelling is its drama: Those who know it best see the long game ahead, and dangers, rather than the cure-all others might have you believe. It's not unlike the initial releases of iOS and Android in 2007 and 2008: It was clear they would forever augment how we interact with each other, access information and engineer new behaviors. But it was unclear just when, and unclear whether that would be universally for the better over time.

As for ledgers, today they are probably hovering around the iPhone 2. The benefits are clear; everyone wants one and they are making our old technology look, well, ancient. But your friend has one—not your whole family. They're mostly still sloshing around the ecosystem with limited user bases and applications, like trade finance or private chains for OTC instruments that seldom trade and settle even more slowly, like securitized debt. Much remains to be hashed out, not just the kinks. Efficient performance for faster-moving, regulated public markets; mutability and chain augmentation to address data errors; interoperability among the handful of chains that have gained traction; data sovereignty issues and, of course, liability and recourse in case of failure—these are just some of the key points to solve for. That's led some to argue that the biggest beneficiaries of blockchain adoption in the short term may not be market participants, at all—but rather their lawyers.

> "We may soon witness blockchain's coming of age."
> **Lee Braine, Barclays**

Yet the knock-on benefits are already present, too. As one blockchain team lead at a tier-one bank recently put it, the noticeable change is in institutional thinking and collaboration—carving out the right fits, and getting prepared. With trade bodies such as Isda

partnering to create standards for blockchain, that preparation may not be a premature as it was back in 2014. As Lee Braine, a ledgers expert within Barclays' investment CTO office, says, "We may soon witness blockchain's coming of age in financial markets."

SEPTEMBER 11, 2001: A DAY WE WILL NEVER FORGET

It seems like yesterday that the world changed forever at 8:46 am, on that crystal-clear morning on September 11, 2001.

The *Waters* staff have, naturally, discussed the events of that day, given *Waters*' poignant association with September 11, even though our youngest staff member hadn't even started high school at the time. But the families of the 16 Risk Waters staff members who lost their lives that day will find little consolation in the knowledge that, as a group, we have spoken about their loved ones, and, while we might not know them, they have been in our thoughts in the lead-up to every anniversary of the day their lives were turned upside down.

Early in the morning on the 10th anniversary of the attacks, as I was readying myself to leave the house and make my way to work, I briefly watched a BBC interview with Margaret (Maggie) Owen, the mother of Melanie de Vere, one of the Risk Waters "16." For me, the interview particularized for the first time in years the emotional devastation of those caught up in the attacks, poignantly conveyed by a mother longing for her daughter, about whom people still talk.

In the days and weeks following "that Tuesday," resolutions were made and bucket lists compiled, but as is so often the case after an emotionally charged episode, we find it all too easy to slip back into normality, fixating on the trivialities of the day-to-day grind, blissfully ignorant of the bigger picture, revealed fleetingly during those flashes of intense, yet infrequent, introspection.

Perhaps now, as we approach another anniversary of that dreadful day, it is time to revisit those resolutions and actually eat with the good cutlery rather than just talking about it. Perhaps now is the time to follow through on those plans to climb that mountain, to serve in that soup kitchen during the festive season, and to enhance those relationships with our significant others.

From all of us at *Waters*, to all of you: We're thinking of you at this time.

Victor Anderson, Editor-in-Chief

We remember our friends and colleagues who lost their lives in the World Trade Center on September 11, 2001.

- **Sarah Ali Escarcega**
  Freelance Marketing Consultant
- **Oliver Bennett**
  Staff Writer, Risk
- **Paul Bristow**
  Senior Conference Producer
- **Neil Cudmore**
  Sales Director, Waters
- **Melanie de Vere**
  Publisher, Waters Reference Products
- **Michele du Berry**
  Director of Conferences
- **Elisa Ferraina**
  Senior Conference Sponsorship Coordinator
- **Amy Lamonsoff**
  Conference Coordinator, North America
- **Sarah Prothero**
  Conference Operations Manager
- **David Rivers**
  Editorial Director, New York
- **Laura Rockefeller**
  Freelance Delegate Coordinator
- **Karlie Rogers**
  Divisional Sponsorship Manager
- **Simon Turner**
  Board Director
- **Celeste Victoria**
  Conference Telesales Executive
- **Joanna Vidal**
  Events Coordinator
- **Dinah Webster**
  Head of North American Sales

- **We also remember our 65 colleagues from the industry who attended the *Waters* conference in the World Trade Center as delegates, speakers, sponsors and exhibitors.**

Industry participants share their thoughts on what lies ahead for capital-markets technology.

By Anthony Malakian and James Rundle

Hindsight, as the idiom goes, is 20/20. Predicting the future is far more difficult, but to those in the know, the foundations for the future state of market technology have already been laid.

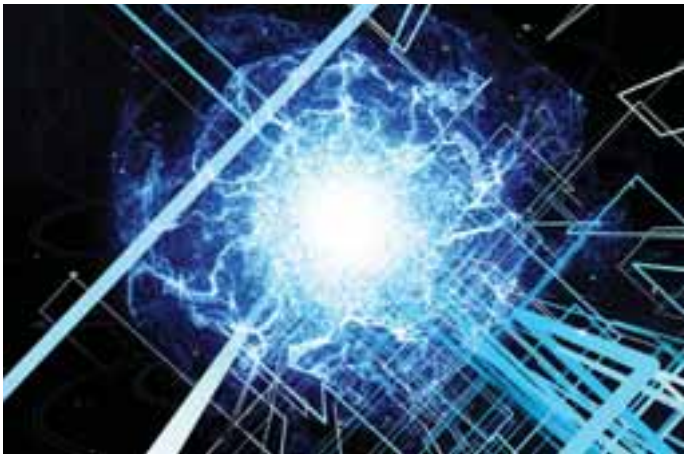
In the first article in this issue of *Waters* celebrating the magazine's 25th anniversary, we looked back over the events that have shaped markets over the past two decades, from the birth of electronic trading through to the terrible events of 9/11 and the financial crisis. In this article, *Waters* canvassed a range of senior figures from the worlds of investment banking, asset management, exchanges, technology providers and consulting to give their views on what the formative technologies in the next phase of capital-markets evolution will be.

To regular readers of *Waters*, some of these topics will be familiar. Quantum computing, distributed ledger and artificial intelligence are all mentioned, of course, but for many, the real power of these emerging technologies lies not in isolation, but in combination.

Read on to discover what the future holds for trading floors, banks, hedge funds and exchanges—and, indeed, society as a whole—from the people who are at the bleeding edge of developing tomorrow.

Quantum Computing

A singular evolution, and possibly, a singularity.



Quantum computing has emerged as one of the hottest technologies under development right now. Its advocates say that it has the potential to instigate fundamental changes in how markets operate—but also in how society as a whole evolves. In stark contrast to the hype machines at work around blockchain and similar technologies, however, even a cursory understanding of quantum suggests this may be more than mere hyperbole.

"We have a partnership now that's been announced with IBM. In each line of business we have a participant who's looking and spotting opportunities in the finance world. I mean that's further off than, I would say, blockchain, but it's not that far off either. What that could do to our industry is incredible. What it can do to security and encryption, and everything else is incredible. I think we are big believers in that."

Michael Urciuoli, CIO, JPMorgan Asset Management

"Of all the trends in fintech, the most promising one I think is quantum computing, which will increase the ability to do heavy-duty computing exponentially **faster**—bolded because this is big—and make practical some interesting algorithms. It will cause us to rebuild all our security and cryptography architectures as they will become hack-able, and will speed up adoption of all the other buzzwords: AI, deep learning, big data analytics, alt data, etc. Our current cloud virtualization architectures will make this available to everyone, with all the major tech players investing in this technology."

Keith Lubell, CTO, Berkery Noyes

"It's hard to pick any one technology as being the answer to the world's problems and that's true here, as well. Quantum is a super exciting space. I'm an applied physicist by training and in school—undergrad and graduate—I remember well solving textbook theoretical problems in quantum mechanics and it was fun, in and of itself, because it had a unique set of rules and challenges, but I truly didn't believe—foresee—that we'd have workable quantum computers in my lifetime available to run experiments and to really see this be applied to real-world problems. That is incredibly exciting."

Kathryn Guarini, vice president, IBM Research

Artificial Intelligence

The machine comes to life, in more ways than were imagined

The laziest trick in journalism is to use a Skynet metaphor—or any quote from *The Terminator* films—to introduce a section on artificial intelligence. It's also ridiculous—artificial intelligence, as a discipline, incorporates any number of subsets, from machine learning through to natural-language processing and the use of big data. The emergence of available compute power coupled with data growth has, of course, breathed new life into theories that are over 30 years old at this point, but for perhaps the first time since the AI winter, there's a palpable sense that this will truly change how we view the fusion of man and machine.

"Our exchanges have now processed a record 52 million transactions in a single day. That massive volume of data presents both opportunities and challenges that can be managed with deep learning and data science technologies. Neural networks can help CME and our clients discover new market opportunities. A decade ago, it would have been inconceivable for traders to have readily available access to daily changes in crop health, oil storage capacity or base metal smelting activity. This is now both possible and advancing, as evident in recent CME Group collaborations with Orbital Insight, RS Metrics and Tellus Labs. Simultaneously these technologies and their capacity for analysis enable us to continually advance how we monitor our markets and ensure integrity. These intersecting technology trends are key to the future of capital markets, and we look forward to being at the forefront as they develop."

Bryan Durkin, president, CME Group

"Artificial intelligence has the potential to be the most impactful advancement of our time as we entrust more of our personal day-to-day lives to technology. Today, we produce and store an enormous amount of data; couple that with the compute power at scale now available to us, and our insights become limitless. It will be an exponential change in how we apply technology's predictive and interactive capabilities. AI done well creates job opportunities. The pace of change, however, is happening at such a rate that it has the potential to fragment societal structure—social, human and legal, to name a few. As with all innovation, AI runs the risk of outpacing our ability to understand and act on its implications. We need to gain a foothold of being ahead by working toward a universally accepted foundation for its use. Changes in the workforce are predictable, and we are accountable to be thinking about the impact of technology and transforming the workforce so we are prepared. Responsible AI is not about what we can do; it is about what we should do."

Cathy Bessant, COO and CTO, Bank of America Merrill Lynch

"While the near-perfect humanoids of the hit HBO TV show 'Westworld' may always be fantasy, the convergence of human intelligence and artificial intelligence in the investment process—from idea generation to trading—is rapidly approaching. The hand-wringing and consternation on the threat of automation to existing roles tends to block out the enormous opportunity to transform the active management investment process. The opportunity will not be achieved merely through the proliferation of alternative data and the rapid advancements in artificial intelligence; it will be a creative wave of portfolio managers, traders, and risk managers who will reinvent active management. It is not about letting purely systematic strategies take over the industry, but rather adapting the investment and trading process to a rapidly changing global economy."

Adam Sussman, head of market structure and liquidity partnerships, Liquidnet

"There is no doubt to me that the automation of more/most-existing workflows using basic technologies and eventually machine learning will continue to drive major efficiency in all financial functions. It will accelerate significantly from here and those that embrace and harness the power of data and machine learning will thrive and the rest will be left behind."

William Murphy, CTO, Blackstone Group

"Artificial intelligence technologies are already being used today much more than people think. That being said, I think we have just begun to scratch the surface of the opportunities for these technologies, and in the next decade the impact will be profound. Machine learning, natural-language processing/natural-language generation, visual recognition and satellite-based applications will all provide the opportunities for companies to create new products, find and service clients, and improve operational efficiency in new and exciting ways. Fasten your seat belt!"

Michael Radziemski, former CIO, Lord Abbett & Co.

The Combination

The future of all these technologies lies in their fusion.

The benefits of cloud computing have been well documented over the past 10 years, not least of all in the pages of *Waters*. For many, the use of private cloud structures are a well-ingrained form of technology, but the shift to the use of public cloud, and the emergence of secure, institutional-grade providers such as Amazon, Microsoft, IBM, Google and others has intertwined with the development of other technologies to provide a foundation layer for the future of market technology. As Kathryn Guarini, vice president at IBM Research says: "Any one technology by itself can't do all the things we need it to do to drive technology innovation—it's the combination."

"I think the capabilities of the future are quantum in a hybrid—and it's going to be delivered via cloud. I think cloud just changes a lot of things that we can't even predict yet. And then quantum computing will be made available by the leading cloud providers. So it's almost like specialized compute, just like your GPU is, and now TPUs with tensor processing units, you're going to be able to add quantum where necessary for simulation and for new applications that we can't even envision yet."

Brad Peterson, CIO and CTO, Nasdaq

"I think quantum computing will have a massive impact, but still, that would help and support and drive the way we use machine learning in this industry. So, I would say the whole buildout of machine learning, the combination of machines and humans in the way we make decisions and improve things—that I think will be the big game changer in this industry. But in a way we also have to remember what the enabler for that will be. That is basically a cloud build-up, and there is basically a bunch of other stuff that needs to be there in order for machine learning to be the big transformer of this industry. So, if we can take for granted that we will have a broader transition to cloud, and we will get cheaper compute, yes, then I think machine learning is the one to pick."

Magnus Haglind, head of product management, Market Technology, Nasdaq

"Some of the biggest areas we're looking at as enabling change over the long term, are cloud computing, machine learning and artificial intelligence, and shifts in how clients think about build versus buy or outsourcing to specialist third parties. This 'best of breed' mentality is extending beyond infrastructure and into processes as well, like regulatory compliance and monitoring, performance attribution, and risk modeling. Clients are turning to firms that specialize in areas such as these, stay current with the latest developments, and offer real-time monitoring and tools that empower practitioners to step in where needed."

Rob Robie, head of analytics, FactSet

"I think quantum computing will be the most important computer technology for the 21st century. Any particular problem, however, whether it's in fintech or anything else, is going to be a combination of everything else. Every single place you look you'll see a combination of classical methods, new artificial intelligence methods and quantum. So it's another great edition to our toolbox and it opens up this amazing intellectual frontier: People get to think about problems in ways they never could before, and we know there are so many really smart people out there who will take advantage of it."

Bob Sutor, vice president of IBM Q strategy and ecosystem, IBM Research

But What About…?

Weaving together other threads into a cohesive technology whole

Predicting the future, as mentioned at the start of this article, is a difficult business. Outside of a few common threads, those also interviewed by *Waters* had a number of other theories about where important developments would take place.

Blockchain

"I believe it will have a seismic and formative impact on the industry—specifically the ethereum branch for smart contracts. In the short term—five to 10 years—I think structured products and derivatives will all be managed via distributed-ledger technology. This will result in incredible back-office efficiencies and translate directly into market growth via transparency, reduced barriers to entry, operational efficiency, etc."
Henry Kravchenko, head of IT, Marshall Wace

The Internet of Things

"Mobile transactions (including banking) become more prevalent, further eliminating the need for cash, foreign exchange, and credit cards, by taking advantage of technologies such as face and voice recognition. Sensors will be everywhere as will the software to interpret events picked up by these sensors. This will facilitate billing by usage, which will change the nature of insurance risk and encourage ride sharing, bike sharing, and the general sharing and trading of small quantities of goods and services. True robo investment decisions will become prevalent as neurological tests are able to measure the emotional biases of investors to implement fully customized, automated strategies."
Elliot Noma, managing director, Garrett Asset Management

Cybersecurity

"Large financial institutions are already heavily investing in cybersecurity defenses and are secure—but are they secure enough? Innovative technology and machine-based learning, such as artificial intelligence (AI), can help safeguard financial institutions against cyber threats even further. Intelligent systems can do everything from monitoring all network activity, to analyzing raw data to identify patterns—all in much less time than a human could, if they were processing the information manually. In fact, powerful AI engines—such as IBM Watson—can go as far as detecting and flagging suspicious activity and in the near future it may also devise defense recommendations, too. Financial institutions need to deploy these first-class technologies in order to stay on top of, and ahead of, the changing threats within the cyber-security landscape. Proactive prevention is essential if finance organizations want to protect their data."
Thomas Zeeb, head of securities and exchanges, SIX

Voice Recognition, Augmented Reality and Virtual Reality

"Technology is going to start to know what's happening, where you're heading and where you might need to be heading, and start to serve it up for you in advance. To that point, it's not going to be one technology, it will be a lot of technologies working together in unison. But think about Siri and Alexa and I see a day where there's going to be something like one of those devices in every office and in every conference room and you'll just ask, 'What were the earnings last quarter? What are the projected earnings this quarter?' It's going to be all voice-enabled where you'll just talk to the device in the room to get all the information you want."
Richard Alexander, managing director, IT, Cerberus Capital Management

Operating Systems

"While much of the buzz (and hope) around the next 25 years may currently be focused on blockchain and quantum computing for financial technology, I see the devolution of the operation system as the most significant paradigm shift on the horizon for the financial technology industry. While many productivity applications continue to rely on Windows for user interactions, and development of next-generation applications orient themselves on mobile platforms, some have pondered the real race for an operating-system-agnostic approach is being waged in browsers. But in reality, the next generation of the user interface has yet to truly show itself. I expect in the next 25 years, the eventual solution will take elements of virtual reality and augmented reality along with data visualization functionality as the underpinning to the coming great user challenges we're facing with larger datasets and more complex applications performing more and more sophisticated workflow and business functions. I can hardly wait to see what evolves and how the various industry forces interact as solutions develop."
Charles Walters, CIO, Halcyon Capital Management

THE INCREDIBLE SHRINKING OEMS Market

Waters speaks with over 20 industry executives to examine the OEMS market, highlighting the two most recent acquisitions, in particular: State Street-Charles River and SS&C-Eze Software.

By Anthony Malakian, with additional reporting by James Rundle and Victor Anderson

Perhaps more than any other segment of technology, the buy side order and execution management (OEMS) space has seen the most M&A activity over the last decade, and 2018 has been its zenith.

The year started off with a bang, as, on January 11, SS&C Technologies acquired DST Systems—which includes its technology, advisory and outsourcing offerings for the financial services and healthcare industries—for $5.4 billion. At the very end of January, it was announced that Thomson Reuters was spinning off its Financial & Risk business—the division that includes its financial content and technologies—to a consortium led by New York-based investment manager and private equity firm Blackstone Group. That deal was valued at $20 billion and it was later announced that the new company would be called Refinitiv.

At the start of February, Ion Investment Group bought OpenLink Financial—a derivatives and futures specialist—for an undisclosed amount. Then, in mid-February it was reported that Temenos was set to nab Fidessa for

> "There are a number of properties that are in the marketplace, or coming into the marketplace, that we have some reasonable interest in." **Bill Stone, SS&C**

£1.4 billion ($2 billion), but that agreement fell through as Fidessa's shareholders balked after rival offers came in from SS&C and Ion. In the end, it was Ion winning out with an April bid of £1.5 billion.

Not to be deterred, SS&C regrouped, and used the war chest it assembled for the now-dead Fidessa acquisition to purchase Eze Software from private equity firm TPG Capital on July 31 for $1.45 billion. And 10 days before that deal, State Street announced that it was adding its Boston neighbor Charles River Development (CRD) for $2.6 billion.

With the dust settling, one could argue that the OEMS space is now dominated by five companies: Bloomberg, State Street, Refinitiv, Ion and SS&C, with a few outliers.

Fintech startups are proving to be increasingly disruptive to legacy technology providers. Additionally, buy-side firms have faced cost pressures that have persisted since 2008 as a result of diminished returns and an industry-wide move from active to passive investments. And, at the same time, the tech world is evolving at an exponentially chaotic rate, thus making it difficult for both end users and vendors alike to keep up with this pace of change. This muddled cocktail is driving the consolidation as the biggest players want to become the fintech behemoth, providing services for the front, middle and back offices for asset managers and hedge funds of all sizes and investment focuses. Increasingly, those in the middle find themselves relegated to niche markets or forced into an acquire-or-be-acquired scenario.

Waters spoke with over two dozen senior executives at a range of banks, hedge funds, vendors and consultancies to better understand how the State Street–CRD and SS&C–Eze deals point toward a larger market shift in the OEMS space, and what this could mean for those smaller and mid-sized vendors who have yet to find a dance partner.

State Street–CRD: $2.6 Billion

The reviews for this deal were mixed among industry participants, with one hedge fund chief information officer asking, "How the hell does Charles River go for that?" and others calling the price tag "outlandish" and "unbelievable." Still others took umbrage at a bank and custodian like State Street being the one to buy a vendor that had remained independent for 30-plus years, rather than another technology company or a private-equity firm.

The CEO of a trading venue says that they have "no idea" what State Street's motivation was for tying up CRD and that they don't think there are a lot of synergies because "all of Charles River's clients are already State Street's clients—they already have the assets in custody." The source adds that a bank buying an OMS provider "has never worked out for them" in the past. But Lou Maiuri, head of State Street Global Exchange and State Street Global Markets, disagrees with that assessment and points to several other successful acquisitions that State Street has pulled off as proof. "We have platforms today [such as] FX Connect, which is the second largest provider of FX liquidity in the world, we have FundConnect, we have Currenex. … We have these trading venues and platforms and EMSs that have been very much a part of our ecosystem and very prominent in the industry."

Others point to Charles River's "stickiness" and recurring revenues as strong drivers for the acquisition. The Charles River Investment Management Solution (IMS)—its OEMS—is ubiquitous at the largest institutional asset managers and banks, hedge funds and wealth managers. It connects front-to-back, with solutions for the middle office, compliance and regulatory teams, portfolio managers and analytics users. It is a hulking, all-encompassing platform that is not easily replaced.

A former user of Charles River who has subsequently switched over to the Eze OMS says Charles River's model isn't necessarily focused on the software as much as it was interested in selling services that would "cater to big, complicated installs—places where software packages get implemented and then run for 20 to 30 years because they're so difficult to rip out."

> "It's important to remember that this isn't just a bank or a custodian acquiring an OMS; this is a much bigger deal than that because this is a large-scale, full-service asset servicer acquiring an integrated asset management platform." **Rob Hegarty, Hegarty Group**

Additionally, the platform is expensive, say sources. Cost estimates for subscriptions, installations, support and maintenance are often closely guarded secrets in the world of traditional financial technology, but estimates garnered from users by *Waters* place the subscription cost for CRD at a hedge fund requiring compliance and with around a dozen seats, with roughly $10 billion in assets under management, at around $350,000 to $450,000 per year for a term license. Initial installation and integration costs could range between $500,000 and $1 million before a single trade is even processed.

With this acquisition, State Street is looking to tap into that revenue stream while creating a better front-to-back experience for users, with CRD bolstering its trading and portfolio management capabilities. In today's environment, scale matters. State Street realizes this, says Rob Hegarty, managing partner at Boston-based Hegarty Group, who has worked with both State Street and CRD in various functions in the past.

"It's important to remember that this isn't just a bank or a custodian acquiring an OMS; this is a much bigger deal than that because this is a large-scale, full-service asset servicer acquiring an integrated asset management platform," says Hegarty, who is also the former global head of US equities for Thomson Reuters. "To even put CRD in the OMS-only bracket isn't fair. I think many people know it's bigger than that, but it's been getting characterized as a bank buying an OMS and this is not that."

State Street's Maiuri seems to agree with this assessment.

"We want to go front-to-back in our own infrastructure," Maiuri says. "Today, there's a lot of infrastructure and inefficiencies in the market structure because of the way that things grew up. Every bank has this problem; this is not a State Street idiosyncratic thing—it's an industry thing. But now that we have a full stack of software, a full stack of data. … [This deal] is going to transform the way we work at State Street to make us more efficient, and we're credible today with our platforms and venues and we want to play that same ground game with a much bigger, prominent provider with Charles River."

SS&C–Eze: $1.45 Billion

Barely a fortnight after State Street announced its acquisition of Charles River, the other big Boston-based OEMS provider, Eze Software, was scooped up by a firm that loves growth through acquisition—SS&C Technologies. Since the Windsor, Conn.-based tech giant was founded in 1986, it has completed over 50 acquisitions.

This deal had hit the rumor mill almost immediately after the CRD announcement. This is likely due to the fact that, in a call with shareholders on May 2, Bill Stone, SS&C's CEO, hinted at another acquisition being likely after it lost out to Ion in the Fidessa sweepstakes.

"We raised a little extra cash and we have about $750 million to $800 million in cash on our balance sheet. There are a number of properties that are in the marketplace, or coming into the marketplace, that we have some reasonable interest in, and those would range from probably a cost of $1 billion to $3 billion," Stone said. "I think with the cash on hand and we obviously still have some dry powder in our debt facilities, we'd be able to accomplish those without much strain on us."

Eze Software is a buy-side specialist and counts asset managers and hedge funds of all sizes as clients. It has done very well with long/short equity shops, according to sources, even though it also supports credit, fixed income and various other instruments. A source at a hedge fund that recently switched to Eze from Charles River says that "they beat Charles River and Advent Moxy and Bloomberg, in particular, with service, so smaller and mid-sized folks like them because they're a good partner."

Sources say Eze Software offered an intriguing proposition to SS&C because of its revenue structure. They tell *Waters* that the bulk of its revenue comes from executions on the FIX network, rather than

through software licenses, which is unusual in the OEMS space. One source puts the breakdown at about 65 to 75 percent of its revenue coming through executions, with roughly 25 to 35 percent coming from software licenses.

"When we looked at Eze Software internally and we looked at the cost, we said, 'Wow, why is that so much cheaper than other OMSs that we've had in the past?' Then you realize that yes, you pay them a license, but they get paid through these executions," notes one hedge fund source.

Eze was valued at about 10.8 times pro forma Adjusted Earnings Before Interest, Taxes, Depreciation and Amortization (Ebitda). Sources found this price to be more in line with what was expected when compared to what CRD went for, with one M&A specialist saying that the price "seems about right" and another saying that the price was "less than what I thought TPG would take after owning Eze for five years, [but it's] hard to say what kind of cash they have used to pay down debt, etc. the past few years."

The Next Domino

It's safe to assume that the OEMS space is not yet done undergoing consolidation. It's not as easy to switch off an OMS as it is a new analytics platform. While cost can serve as the great equalizer or the method of comparison, in the OMS space—especially for bigger, more complex institutions—it's not always the be all and end all.

More important is functionality and, specifically, business function. What drives buy-side shops to get a new platform is if the current OMS doesn't support the instruments they want to expand into—like adding equity swaps or complex fixed-income products—or the manner in which they want to trade—such as trading on spreads and they need a more customized execution ticket. Cost is the first stop when going through a system reboot or upgrade, but it's more about how this platform can help the firm get from point A to point B.

> While the market is shrinking, there are still other vendors—large, medium and small—that a buy-side shop could turn to should the Big Five not suit their needs or cost constraints.

While the market is shrinking, there are still other vendors—large, medium and small—that a buy-side shop could turn to should the Big Five not suit their needs or cost constraints.

Prior to the SS&C–Eze deal, some sources speculated as to whether or not IHS Markit, which offers the thinkFolio platform for order management, might step in to bolster its front-office offering. While they could still potentially look to add to its OEMS capabilities through acquisition, sources familiar with IHS Markit's thinking believe that if they are to hit the market, they'll likely target a data technology firm. Another big financial services firm, FIS, has already made a splash in the M&A space thanks to its purchase of SunGard, which runs the Front Arena platform, in 2015.

SimCorp has a number of services targeted toward the buy side, including its Dimension platform, which has both investment book of record (Ibor) and OMS capabilities. Enfusion Systems is another intriguing vendor that offers a combination of portfolio accounting and OMS services. Black Mountain Systems, which is mainly optimized for the loan industry, was acquired by Stone Point Capital, a private equity firm, in 2015, so they might not be ready to flip the platform just yet, a la TPG with Eze.

Also out in the field is Virtus Partners, which has an OMS called Glide for the collateralized loan obligation (CLO) and credit default swap (CDS) markets. SmartTrade Technologies has a solution geared toward foreign exchange (FX) and TradingScreen has the TradeSmart OMS. Meanwhile, Tora is an upstart technology provider making inroads in Asia with its Tora OMS.

To be sure, there's still competition out there, but the market is getting more difficult for the smaller players. But perhaps it's always been that way.

"About 10 years ago, when investors put out due diligence questionnaires, they'd ask if you had Eze OMS, Bloomberg AIM, Charles River and maybe a couple other big ones—if you did, then you could skip the next 100 questions. I'm serious," says the hedge fund CIO. "So if your investor relations people have a seat at the table and if you're savvy enough to know what could be coming, having [an outside OMS provider] just creates more questions. We just wanted something that our investors were familiar and comfortable with."

As the OEMS world continues to be dominated by a handful of monsters, with smaller, hyper-targeted platforms servicing more complex instruments, it will become increasingly more difficult for mid-tier places to operate independently. So the question becomes: Who's next? W

SFTR: Technology Holds the Key for Reporting's Next Hurdle

The Securities Financing Transaction Regulation has seemed like a distant target until now. The European Commission's latest response to the regulatory technical standards has refocused the spotlight on the regulation, with a new set of challenges and technology demands rearing their ugly head on an area of the industry that's been largely untouched by lawmakers. By Josephine Gallagher

If you thought reporting had been getting tough in Europe, well, you ain't seen nothing yet.

It's becoming more and more likely that SFTR, first introduced in January 2016, could be ratified in the coming weeks. The European Commission's formal letter to the European Securities Markets Authorities (Esma) in July 2018 outlined its intention to endorse its draft regulatory technical standards (RTS), contingent on two amendments, meaning firms are having to assign project teams and technology resources now to prepare for reporting requirements that are likely to take effect in the first quarter of 2020. Although the Securities Financing Transaction Regulation (SFTR) has been on the radar of larger firms for some time, not everyone has earmarked the regulation as a priority just yet.

"Some firms are waiting for the RTS to be approved as that has been delayed a few times," says Val Wotton, managing director of product development and strategy, derivatives and collateral management at the Depository Trust and Clearing Corp. (DTCC). "You can see that some haven't mobilized teams yet and I think they might be using that [the ratification] as a starting gun."

The reality is that this won't be a simple implementation project. Not only is SFTR complex to begin with, it is targeting a section of the

"A lot of firms have a diverse, data strategy problem and challenge. They're getting data from a lot of different systems that were never designed to talk to one another and these are decade old infrastructures."
Carla Jane Findlay-Dons, Brown Brothers Harriman

market that stretches across multiple divisions including repurchase agreements (repos), margin lending, stock loans, buy/sell-backs and commodity loans. SFTs have been largely unaffected by regulatory requirements until now, meaning some of the industry has been slow to embrace the likes of automation or digital trading practices. Pierre Khemdoudi, managing director and global co-head of equities, data and analytics at IHS Markit, says "the industry has been carrying a technology debt," particularly across the repos market.

"We're talking about hundreds of millions of events going through trade repositories, sometimes in real-time, being enriched across multiple assets," he adds. "So it's fairly complex when you look at the outputs of the regulation and what it requires. When you look at the technology stack, to what would be a regulatory engine, it is fairly disparate, primitive and not standardized."

The Technology Awakening

In survey published in March 2018, the International Capital Market Association (Icma) estimated that by the end of 2017 the European repo market was valued at nearly €7.25 trillion ($8.5 trillion). Today a large portion of that repo market is still operated on legacy systems and relies on manual processes to execute trades. Millions of transactions are carried out using basic technology and old-school practices such as emails, phone calls, faxes and spreadsheets.

Glenn Havlicek, CEO and co-founder of repo-trading platform GLMX, illustrates how that lack of automation can increase the chances of operational errors.

"There is a senior employee working at a bank and an active broker-dealer working in repo who told me that they have two people working eight hours a day each, just to re-key repo trades," he says. "That takes a lot of time, effort and cost."

Today, automation and modern-day reporting technologies play a vital role in meeting regulatory obligations, and with that SFTR is no different. The regulation mandates a dual-sided reporting structure, where both counterparties are required to report the details of the "conclusion, modification and termination" of an entire event lifecycle on a T+1 basis to a trade repository. This can prove almost impossible for firms lacking the technology infrastructure to capture all transactions, manage large volumes of data and track complex collateral chains. Carla Jane Findlay-Dons, chief global regulatory and market strategist at Brown Brothers Harriman, explains that some firms are having to build reporting systems from scratch, or rely entirely on third-party providers due to the complexity of gathering data from multiple sources.

Alejandro Perez
Bloomberg

Pierre Khemdoudi
IHS Markit

"A lot of firms have a diverse, data strategy problem and challenge," says Brown Brother's Harriman's Findlay-Dons. "They're getting data from a lot of different systems that were never designed to talk to one another and these are decade old infrastructures."

For the first time, SFTR will require multiple parts of a firm to effectively communicate with one another, connecting trading operations with the regulatory reporting division. Although the regulation has a similar framework to that of the European Market Infrastructure Regulation (EMIR) as they both mandate two-sided reporting to a trade repository, SFTR also targets non-financial firms and includes a staggering total of 153 data fields. Additionally, each counterparty at the end of day reporting is tasked with providing its relevant trade repository with a unique transaction identifier (UTI), a legal entity identifier (LEI), and a master agreement.

"The challenges are around a number of data elements that are required today, the availability of those data elements and the process of generating UTIs," says DTCC's Wotton. "There is a concern around the amount of breaks there will be from a reconciliation perspective and what operations are required to avoid these."

The concerns involving breaks in the reporting process are not to be underestimated. Within a regulation that can involve multiple parties, capturing data within complex chains of

events can be a struggle even for the largest banks or buy-side firms. Key to this process is the agent lender. Not only do they play a crucial role in disclosing transaction information to the relevant counterparties, their commitment to an industry wide technology solution is vital in order for liable firms to fulfill their regulatory obligations.

The Middle Man

Agent lenders or prime brokers are responsible for operating on behalf of the beneficiary, the lender, in allocating trades and ultimately acting as a middleman between them, the borrowers and other counterparties. Although they do not hold a reporting obligation under SFTR, their role is crucial in ensuring both liable parties fulfill their reporting obligations, by providing them with the relevant transactional and collateral information. The beneficiary can also delegate the reporting obligations to the agent lender, but ultimately the regulatory responsibility will remain with lender and borrower.

"The agent lenders community currently house most of the data that is required for SFTR reporting and other requirements," says Brown Brothers Harriman's Findlay-Dons. "So, it seems like the natural place for a delegated reporting service. I also think that with the level of transparency that SFTR is lending to the industry, the securities lending parties are best placed to ensure that the data is in a consumable and enriched state where required."

Agent lenders currently follow an agent-lender disclosure (ALD) process to provide post-trade settlement information, a system that is unsatisfactory for borrowers to comply with SFTR. As the regulation requires the lender and borrower to provide all intraday transactions, to assist this process and help prevent breaks, agent lenders would need to leverage technologies such as lifecycle reporting solutions, booking models, network capabilities between firms, data management systems and UTI generators.

Val Wotton
DTCC

"You might as a lender be out of scope of the regulation, but you still have to be able to provide some information to your borrower to allow them to report," says IHS Markit's Khemdoudi. "So just because you are out of scope, you cannot wash your hands of the regulation, and the industry, as a whole, needs to be engaged in that effect."

To streamline the process further the industry needs to adopt a standardized booking model and reporting system, to enable multiple counterparties to easily communicate and disclose information, experts say. These efforts are currently taking place, as some of the world's leading agent lending and securities finance arms have signed up to Pirum Systems and IHS Markit's design partnership group for its SFTR reporting solution—the industry heavyweights are JPMorgan, Brown Brothers Harriman, Deutsche Bank Agency Lending, UBS, BNY Mellon, Citi, Morgan Stanley, Rabobank, Vanguard, RBS, and eSecLending.

Harpreet Bains
JPMorgan

Harpreet Bains, global product head for agent lending at JPMorgan, says that creating a standardized model and enabling event-driven automation between firms is crucial to minimizing errors, breaks and reconciliation issues.

"SFTR is driving the design of a new target operating model and technology is a crucial dimension of that," she adds. "We look to technology as enabling change and a provider of speed, efficiency, and standard solutions. However, you have to view SFTR as more than just a reporting regime where you extract and submit by a reporting deadline; rather, in order to achieve compliance, you need to look at the business practices within the firms across the industry."

Now as lenders and borrowers are tasked with already complex reporting requirements, SFTR demands that firms adopt additional technologies to convert all messages and reports into a standardized format. The next questions are how realistic is this industry wide adoption and what are the reconciliation challenges that lie ahead?

Standards

Under SFTR, each counterparty on either side of a transaction is obliged to convert all data captured in a transaction lifecycle into the financial services messaging standard, ISO 20022. Esma has clearly outlined its intentions to standardize the regulatory reporting process by mandating that repositories must not accept reports in any other format. Tom Pikett, trade and transaction reporting product manager at Trax, says more and more firms are turning to third-party providers to translate and deliver these messages into the ISO 20022 XML format, to and from the trade repository.

"It is important because the myriad systems are outdated, particularly on the repo side and even on the securities lending side," he adds. "They don't know what ISO 20022 looks like so it is important for us to be offering that as a service."

This challenge further intensifies when firms are having to collect data files from multiple sources across a variety of IT systems in a timely and accurate way. In an industry that has yet to become fully automated this can prove extremely difficult when capturing and converting the likes of voice records, emails, PDFs, faxes and Microsoft Excel documents into a single format. This process requires firms to pump a considerable amount of their budget, time and effort into creating sophisticated SFTR projects.

"Folks have to remember that when asset managers, custodians and any other player in the industry are adhering to regulatory requirements, they have to build out technology projects whether that be for reporting or even just aggregating and cleansing data," explains Brown Brothers Harriman's Findlay-Dons. "That often takes months, if not years, to turn out technology projects"

To complicate things further, the industry has yet to reach a consensus on whether all participants in a transaction chain should be made to adopt the ISO 20022 messaging format to assist borrowers and lenders in fulfilling their regulatory obligations on time. It is yet to be seen whether all agent lenders, key players in the reporting process, will leverage technologies to convert data from transactions, collateral and metadata into the standardized output.

"The role of the agent is central because they are the ones that hold a lot of the information and in some cases the only ones in the chain who have the information at a certain point in time," says IHS Markit's Khemdoudi. "So it's important that they are all engaged and completely understand the complexities of SFTR so they can implement the right solution. Because a big part of the industry value chain relies on them performing well through the reporting."

Mark Jones
Northern Trust

Tom Pikett
Trax

In preparation for the go-live date, many tier-one firms are developing pre-matching and break-prevention strategies to minimize the risk of reconciliation issues when submitting to the trade repository. Data management systems will be used to capture the data, identify breaks and validate quality. Other technologies can be leveraged such as matching platforms, trade confirmation technologies, UTI generators and solutions used to convert messages into ISO 20022.

"The industry is trying to achieve reconciliation before reporting to ensure the reports are submitted in the most robust way possible," says Mark Jones, head of securities lending, EMEA at Northern Trust. "So there is less chance of problems because that reconciliation process has already happened and issues have been ironed out before you've actually submitted your report to the trade repository."

Global Impact

As SFTR contains a dual-sided reporting framework, the two sides of a transaction need to be submitted to the trade repository by the end of each day. This can prove challenging in situations where a counterparty is trading with a non-EU domiciled firm. Although, firms operating outside of the EU are not legally obligated to comply with SFTR, it is crucial that such firms cooperate with their EU counterparts by disclosing the necessary data required to fulfill reporting requirements. Pikett explains that obtaining that information from non-EU traders is one of the biggest areas of concerns for reporting gaps.

"You need to know the master agreements type and LEI," he says "There is a lot of counterparty data that needs to be collected and some of it reconciled as well and I think firms are going to struggle to do this across all of their counterparties, particularly when their counterparties are outside of the EU or a jurisdiction that requires things such as LEIs."

It is suggested that even non-EU counterparts may have to adopt technologies to enable real time, or timely, disclosure of reporting data. Much of this is yet to be determined as the market awaits confirmation of a go-live date. Other jurisdictions are keeping a watchful eye on Europe, as they consider rolling out their own versions of SFTR. In July, the US Department of the Treasury published a proposed rule for data collection of centrally cleared transactions in the US repo market. Japan is another jurisdiction that is considering its own version of SFTR. As the G20 commitment seeks to provide global standards, some suggest harmonization of the global securities lending and repo markets is no longer inconceivable.

"I wouldn't be surprised if we saw this regulation extend beyond Europe, and transparency to be harmonized globally," says Alejandro Perez, global head of post-trade solutions at Bloomberg. "I think it would make sense, provided that SFTR is successful."

Until then firms are having to become jurisdictionally nimble in order to continue trading with global counterparts. As Europe paves the way in regulating the securities finance market in an effort to improve transparency, it is crucial that firms reporting infrastructures can evolve with the changing regulatory landscape.

"Global outreach, scale and flexibility are key features from a technology solution that will help us to efficiently cope with any divergence in requirements that may arise," says JPMorgan's Bains. "Because there is a risk that though SFTR will get similarly taken up by other regulators it could come about in different forms and with different requirements." W

Africa's Sleeping FINTECH GIANT STIRS

Technology penetration in the financial markets of Africa has been slower than other parts of the world. But promising developments, particularly in emerging hubs such as Mauritius, are setting an example for the rest of the continent. By Hamad Ali

Africa has been slowly waking up to the power of fintech. The growth in technologies used in financial exchanges, blockchain and the adoption of cloud technology offer interesting opportunities for investors in Africa.

Technology providers have also focused on the possibilities offered by the sheer size of the continent, which is home to over 1.2 billion people. Most consider it an important growth area over the next decade—in particular, Western exchange operators. The sheer size of Africa and the potential for scale are key, according to Lorne Chambers, global head of sales for London Stock Exchange Group Technology (LSEG Tech).

"We supply technology for about the same number of trading venues in Africa as we do in Europe," he says, illustrating the scale of the market.

It's also a time of change for the continent, which is hungrily embracing the promise of fintech as a means to move its technology base from underbanked mobile users to developed market economies—and, increasingly, it's a time of change for traditional power centers.

Change at the Top?

In the eyes of most observers, South Africa has traditionally been the most important financial market in Africa because of its size, developed economy

> "South Africa really starts out with this advantage of a highly sophisticated financial market infrastructure. And of course a very highly sophisticated established technology backbone. So we have a lot of wireless, a lot of fiber, you know all of these things are well established." **Nicky Newton-King, Johannesburg Stock Exchange**

and technological sophistication. But now, there may be room for challengers to emerge.

In the World Bank's Doing Business report for 2018, the country fell to number 82 in the rankings, owing in part to its febrile political climate and continuing economic volatility. South Africa's currency, the rand, has been going through a difficult period this year, and last year the S&P downgraded the country's credit rating to "junk" status.

Despite the country's recent troubles, it should not be overlooked that South Africa has the oldest exchange on the continent in the form of the Johannesburg Stock Exchange (JSE), which was established in 1887. According to Nicky Newton-King, CEO of the JSE, if you trade on the exchange, it is exactly what you would expect from the most sophisticated markets in the world.

"South Africa really starts out with this advantage of a highly sophisticated financial market infrastructure," she says. "And of course a very highly sophisticated established technology backbone. So we have a lot of wireless, a lot of fiber, you know all of these things are well established."

The JSE licences its equities technology from MillenniumIT, part of the LSEG. The exchange is about to move its derivatives trading onto the same technology. Its clearing technology is being developed by Swedish fintech firm Cinnober.

Newton-King talks about more than one financial hub on the continent, mentioning that South Africa, Mauritius, Kenya and Nigeria are all looking to be positioned as some form of hub for their region. "All of us bring different benefits to the table," she says. "So, I think you would expect to see quite a lot of positioning. I don't think there is going to be one financial center or hub on the continent. I think there are lots of benefits that each of these has. And they will attract different sorts of clients."

This is a key point to understanding Africa as a whole, says David Strevens, regional manager for the Middle East and Africa at Bloomberg. While South Africa is the most visible market internationally, it is not necessarily representative of the entire continent.

"These are economies that continue to expand," he says. "An investor would call them frontier markets. They are not the scale of some of the Asian emerging markets. You need to look at Africa in two ways, in the sense that South Africa is a very different financial market to the rest of Africa. I look at South Africa as an immensely developed financial market. Some of the complexity of the things that you see there are akin to what is going on in Europe, whereas the rest of Africa is still going through that stage of a growing capital market."

Lorne Chambers
London Stock Exchange Group Technology

David Strevens
Bloomberg

With this in mind, a hub model seems particularly well-suited to Africa's geographic and political considerations. The island of Mauritius, located off Africa's east coast, in particular, is pushing to be one such hub.

New Frontiers

With its population of just 1.3 million, and relatively isolated location, Mauritius may not be the first African nation that springs to mind as a haven for fintech. It is looking to change that, and it's already attracted interest.

Hirander Misra, CEO of GMEX Group, first travelled to Mauritius nearly a decade ago and fell in love with the island. But the attraction for entrepreneurs like him goes beyond the sandy beaches and sun. "Mauritius has always been a gateway for capital out of Africa and into the rest of the world," says Misra. "Also, capital into Africa from the rest of the world."

In June 2018, the company announced plans to launch the Mauritius International Derivatives and Commodities Exchange (Mindex), a venture on which the company worked closely with the British High Commission and Department of International Trade (DIT) Mauritius.

Another advocate is Bipin Gooriah, CEO at Forward Risk Management (FRM), a Mauritius-based provider of consultancy and implementation services for integrated risk management. He is also a director of Mindex. "At the moment no other country in Africa is as sophisticated as Mauritius in the provision of financial services," he says.

He says the country is primed to play a pan-African role, noting the lack of exchange controls in

Mauritius. In the same World Bank report that charted South Africa's slip in the rankings for the best places to start a business, Mauritius was in the ascendant, placing 25th out of 190 nations.

Gooriah mentions the large number of financial services companies serving Africa already operating in Mauritius as advantages of doing business there. The country's legal system, also, is derived from French civil code and British common law. The political situation is stable with a democratically elected government. In addition, the Prime Minister, Pravind Jugnauth, has also served as the country's technology minister and actively takes an interest in fintech-related issues—at the start of September, he will be attending an Organisation for Economic Co-operation and Development (OECD) conference on blockchain in Paris.

"There have been a lot of initiatives," says Keith Allan, British High Commissioner to Mauritius. "They have been setting up regulatory committees to look at how they can take this forward using advice from overseas. There are two British experts on this financial-services regulatory committee."

He notes that Mauritius is quite different from most of Africa in terms of economic development. "They already see themselves as more of a hub for business in the region, for Africa, but also into Asia," he says. "The financial services sector has been growing and so they now want to move deep into that, into fintech, and that sort of area. So they have made it a sort of top priority for them. [In addition] you already had some financial sector infrastructure. A lot of the banks are here—HSBC, Barclays, most of the key banks—and you have fund managers here."

Hirander Misra
GMEX Group

Some of those initiatives are already bearing fruit, in contrast to some regional neighbors, who have yet to move beyond planning stages.

"In 2016, Mauritius introduced a Sandbox Licensing Scheme that enables ventures to operate in a compliant manner even where regulation doesn't yet address the underlying activity," says James Duchenne, honorary representative in the US for the Board of Investment of Mauritius. "In addition, the government has set up several incentive schemes, including the National SME Incubator Scheme, the Innovator Occupation Permit, and a fintech association."

Duchenne adds that in the recent national budget it was announced that Mauritius will also soon unveil a regulatory framework for cryptocurrency custody and exchanges. "This will bring a further boost to the evolution of fintech in Mauritius as it meshes with the world of blockchain," he says.

Historically, the country has benefited from being an early mover in the technology space. In the late 1990s and the early 2000s, when a lot of exchanges were starting to go electronic on a global scale, Mauritius was one of the trend leaders from an African perspective.

For example, LSEG Tech's Chambers recalls that Mauritius was one of the company's first partners in Africa. "We were proud to supply the exchange with both a trading system and a depository system in 2001," he says. "Our solutions then became understood widely throughout the rest of Africa. The connection with the Stock Exchange of Mauritius was in many ways the catalyst for our technology now being used in a number of countries across Africa."

James Duchenne
Board of Investment of Mauritius

Tech Base

More widely in Africa, the continent actually has some advantages over more developed economies through fintech. Whereas the US and parts of Europe have typically been slow to embrace mobile technology, for instance, Africa has been a fertile ground for payments technology for some time.

Bloomberg's Strevens, for instance, recalls being fascinated by the use of cellphones and a platform called M-Pesa while on a trip to Kenya in 2010. "When one looks at what was going on in Kenya and the use of M-Pesa in 2010, and how sophisticated they were from a mobile banking perspective, that gives some interesting examples of how technology has led banking disruption in Africa," he says. "It was to me an early example of mobile banking, which was well ahead of some of the markets in Europe or America."

With a billion-strong population, and large, urbanized centres like Lagos, Cairo and Johannesburg, technology is a necessity, says Michele Carlsson, managing director, Middle East and Africa, at Nasdaq. She talks about making technology accessible for the majority, especially when many in Africa are still unbanked. "Fintech can make it easier for both providers and users to meet. For example, when I travel to Nigeria, I see how techy people are with their phones, and they often prefer an Android [device] to be able to use the extra apps required to utilize the smartphone as much as possible," she says.

Michele Carlsson
Nasdaq

Still, Carlsson adds, that doesn't always translate into enterprise-grade technology. At the risk of generalization, she says, Africa is "slightly behind when it comes to technology spending, at least from a capital-markets perspective."

One technology that holds a great deal of promise in terms of bringing African nations up to code quickly, though, is cloud. As traditional on-premises installations require vast funds to undertake for most major software implementations, the possibility of deploying services on a hosted or managed basis becomes particularly attractive. Then it becomes a simple matter of connectivity rather than building expensive, large datacenters or server farms.

LSEG Tech's Chambers says the company is putting a lot of thought into multi-tenant cloud-based exchange systems for clients. "So rather than each country buying its own exchange hardware, setting up datacenters and employing staff to run it all, what if sometime in the future they could just rent an exchange in the cloud? This option may make it more viable to operate a national exchange, but you would still need the same regulatory approval and supervision, legal framework, and post-trade processing and settlement."

The JSE, too, by far the most technically sophisticated market on the continent, is exploring the use of cloud. Newton-King says that while it is not "looking at putting execution technology in the cloud," the possibilities are ripe for "storage, and some of our less latency-sensitive stuff."

Perhaps the most encouraging signs, however, are in the numbers and the enthusiasm for growth. Initial public offerings in Africa rose to around 30 last year, says Nasdaq's Carlsson, which might seem like small fry to the number run in New York, London or the European mainland, but which are a steady improvement from years past.

The would-be hubs are also forging international links—in July 2018, the Chinese Premier, Xi Jinping, visited Mauritius to discuss its participation in the Belt and Road initiative, and the country has strong historic ties to India, which is expected to become an economic powerhouse in the future.

The appetite is there, the academic links are forming, and with the emergence of fintech as a priority for many governments, the impetus is building. What many feel would help kickstart the continent's technology revolution is the involvement of big technology companies.

"I wish we could see the global tech players like Google and Amazon more active in Africa," says Nasdaq's Carlsson. "Africa is far behind when it comes to cloud technology, compared to the rest of the world. It is a shame really, as cloud computing, besides the initial investment, lowers cost and improves productivity and info security. There's really great opportunity for this in Africa," she says. W

SALIENT POINTS

- Africa is waking to the promise of fintech. In particular, Mauritius is taking impressive steps to develop its fintech sector with talk of a pan-African hub developing in the island nation.
- While Africa lags in spending on financial technology, the deep penetration of mobile technology has the potential to be a game-changer in the long-run, allowing it to leapfrog developmental phases that mature markets have had to cope with.
- Opportunities to bypass expensive infrastructure by using cloud offer one solution to the cost barriers many African markets face.

Another World: Virtual and Augmented Reality Infiltrate Trading Floors

As augmented reality and virtual reality devices become more accessible, financial institutions are seeing the technology's potential to overhaul how their staff communicate and bring data to life in ways that simply weren't possible before. But projects may still have to wait years before they make their way to the trading floor.

By Emilia David

One day, in the future, a trader will pick up a shiny pair of glasses, put it over their eyes and instantly bring up the image of a counterparty that, despite being thousands of miles away, looks like they're sitting right in front of them.

That is one of the scenarios financial institutions envisage as they experiment with virtual reality (VR) and augmented reality (AR)—especially now that commercial devices can now be easily bought from Best Buy for a few hundred dollars. Once clunky headsets that rendered cartoonish surroundings, modern technology has advanced to the point where, ergonomically and visually, the everyday use of VR has become a possibility.

VR, AR, and mixed reality (MR) have been generating interest since the first ranges of modern devices were released to consumers a few years ago, and interest reached a fever pitch when Facebook bought Oculus VR—maker of VR headsets—in 2014. Data from the VR/AR Association, an industry lobby group, estimates total market size for the technology to reach $108 billion to $215 billion by 2021. Investments into the technology also reached $3.5 billion in 2016, based on figures from a report released by Goldman Sachs in 2016, *Virtual and Augmented Reality: Understanding the Race for the Next Computing Platform*.

Much of the consumer technology in VR and AR—especially VR—is

> "The financial markets are going to follow these investments into AR and VR because they don't want to be left behind." **Mihir Shah, Synechron**

geared toward the entertainment sector, either for movies or deeply immersive gaming experiences. The Goldman report, however, sees enterprise VR becoming a $180 billion market by 2025.

And it's these potential applications that are enticing some banks and financial institutions to experiment with the technology.

Fidelity Labs' head of emerging technologies, Adam Schouela, says AR and VR offer a fresh approach for new ways to understand data, build better services and even free up cognitive space for research.

"We want to be ready and develop applications for when these form factors take off," says Schouela. "VR has been a preferred training tool for maybe 40 years, but the technology has become more accessible so we can better leverage its blank canvas."

He adds Fidelity Labs, and many others in the financial industry, see AR and VR as a more visceral way of presenting data so the information has much more of an impact.

Eyes Front

Though VR, AR and MR all depend on a device to plunge users into essentially different worlds, they are not all the same. VR devices such as Oculus Rift and the HTC Vive platform totally immerse a person in a virtual world by taking much of the actual world out. AR devices, such as Microsoft HoloLens or Glass, augment the real world with virtual information. That can take the form of overlaying an object from a device onto the street or wall, seeming as if it belongs there, to heads-up displays commonly seen in military applications. It is less immersive and allows a person to retain awareness of their surroundings. MR, sometimes referred to as extended reality, functions like AR but with the added flourish of a physical reaction occurring in the world when an action is performed.

"We're excited about the possibilities enabled by Microsoft HoloLens and see a wide array of use-cases for all," a Microsoft spokesperson tells *Waters*. "We've been on a decades-long journey to make computing more personal, and this is a logical extension of that path. Bringing computing into the three-dimensional world that humans have always existed in is the next step in making computing truly more personal."

Many large financial institutions have been experimenting with AR and VR, mostly in proofs of concepts in the past few years. So far, experimental projects have ranged from mapping out data in three dimensions to letting customers visit a virtual bank, running the gamut from services for institutional investors to simply making the banking experience easier for the retail customer.

Adam Schouela
Fidelity Labs

Citi and its development partner, 8ninths, launched a virtual trading desk using Microsoft's HoloLens in 2016. BNP Paribas also began several experiments with the technology including a program offering a virtual walkthrough of a property being sold, chat with a bank representative, and one teaching business continuity procedures. Wells Fargo hopes to put out a product where customers can converse with a bank teller through VR. Citi did not respond to requests for comment on the current state of that project, however, and BNP Paribas declined to comment.

Fidelity, through its Fidelity Center for Applied Technology, launched several projects including Cora, a proof of concept it worked on with Amazon. The idea behind Cora, says Schouela, was to see how to marry voice technology with the 360-degree blank canvas of VR. Cora is a virtual "host" that can answer questions prompted by voice commands and find information quickly. The company also currently uses VR technology to train its customer service agents.

"Within VR we have four main use-cases that we spin out—data visualization, that's the vein Cora is in; customer education to help them understand more complex financial concepts; employee training, like our empathy training module for our contact center associates; and collaboration to see how might this experience be better than a voice or video call," he says. "We have real experiments to try out to see where this technology is better than the ones we're using today."

Schouela says Fidelity has seen good results from the customer service training proof of concept: Those who trained using VR—which lets users run through customer service scenarios and virtually visit a client—showed better customer satisfaction ratings overall.

It isn't just banks playing around with AR and VR, though. Exchanges are also looking at how the technology can work for them.

Nasdaq's chief information officer and chief technology officer Brad Peterson says the exchange is experimenting with AR in its surveillance function. Using HoloLens, the group has trialed the use of AR in the NOC, its market control center in midtown Manhattan, which oversees the operation of the second-largest exchange in the world.

"We're starting to see, in things like surveillance and workgroups, pretty exciting interfaces that combine voice and gesture navigation," Peterson says. "Let's say we're at our surveillance room. In a traditional one, we all have our own screen. If we're working together with AR, all of a sudden we can be working on all the markets and maybe we can be working on a factor of magnitude more efficiently."

He adds Nasdaq wants groups within the exchange, say those in operations and surveillance, to be able to collaborate using this technology. Nasdaq has worked with students from the Massachusetts Institute of Technology to integrate voice commands with an AR workflow to pull up data during a meeting and enhance working groups. AR, in particular, works well for this, Peterson says—rather than headsets that obscure and isolate individuals, AR instead acts as a force multiplier and encourages collaboration.

And yet, the financial services industry still has a lot of catching up to do.

Other industries have managed to use AR and VR and integrate them into their workflows. A spokesperson for Microsoft tells *Waters* many of projects developed for the HoloLens—which also include many MR programs—"demonstrate how HoloLens is already transforming businesses including Ford, thyssenkrupp, and Stryker, among others."

Glass—the product formerly known as Google Glass—has transformed itself as a tool for manufacturers to quickly double check schematics or data and for healthcare professionals to chart medical information. Glass is no longer available for retail customers but is offered exclusively to enterprise users.

Extending further into healthcare, some are using commercial hardware and custom-built environments for the

diagnosis and potential treatment of mental health patients.

Despite success in other industries, however, there are some considerations the financial industry has to deal with if it wants widespread use of AR and VR technology, particularly if the use case a bank has in mind is more client-facing than within the organization.

Blind Spots

Mihir Shah, a senior director at consultancy Synechron, points out there are issues to contend with before VR and AR are ready for prime time, particularly in terms of cost, distribution and security around the use of the technology. That's not to mention the specialized skillset required in computer graphics and special effects software packages, talent that's more likely to be found in the Presidio rather than Park Avenue.

"The cost of it really makes it something that only big firms can do, since it takes millions just to develop a base application with strong user experience, plus the high processing software needed to build the environment," Shah says. "But other than that you have think about how you're going to distribute the device to users and since some applications depend on the internet, you also need to determine how to secure that connection."

Adoption is also dependent on how quickly technology companies can refine and reduce prices on their devices, according to Dimitry Parilov, managing director for data solutions and products at vendor dxFeed.

"Only the development of the hardware really holds adoption back because companies are pilot testing projects and they want these to be device agnostic. These are still mostly in development so we're waiting for them to really get ahead," says Parilov.

DxFeed is in the process of building out an AR application that allows clients like banks and proprietary trading shops to build out a simulated three-dimensional model of a graph. Parilov notes that with technology like AR, traders essentially can have as many screens as they want to and even pull out certain data points. While people are definitely interested, he says, firms are cautious and are taking their time deciding if they will invest in the technology.

Dimitry Parilov
dxFeed

Fidelity's Schouela, Synechron's Shah and dxFeed's Parilov all say that full commercial production is still a ways off. Shah even predicts commercial production of financial services applications could take four to five years, assuming firms have figured out the right use-case, data security and hardware distribution for users.

And it isn't just the cost of the devices: While AR and VR developed at the same time, the hardware did not. AR devices, visors like HoloLens and Glass, must be able to track physical surroundings at all times, and as such have to be mobile in nature while incorporating enough processing power and optical hardware to perform at a high level, consistently. Meanwhile, VR headsets can be connected to a cable and while bulk may be an issue, it doesn't have to be a completely lightweight visor.

But the biggest drawback of all is one that befalls all new innovations—the tendency to use the technology like a hammer, says Schouela, to solve every single problem.

Trick of the Eye

Despite how far away the commercial production of a lot of the prototype AR and VR applications are, Shah notes the financial services industry—especially firms with larger research and development budgets—absolutely can play around with the possibilities it offers.

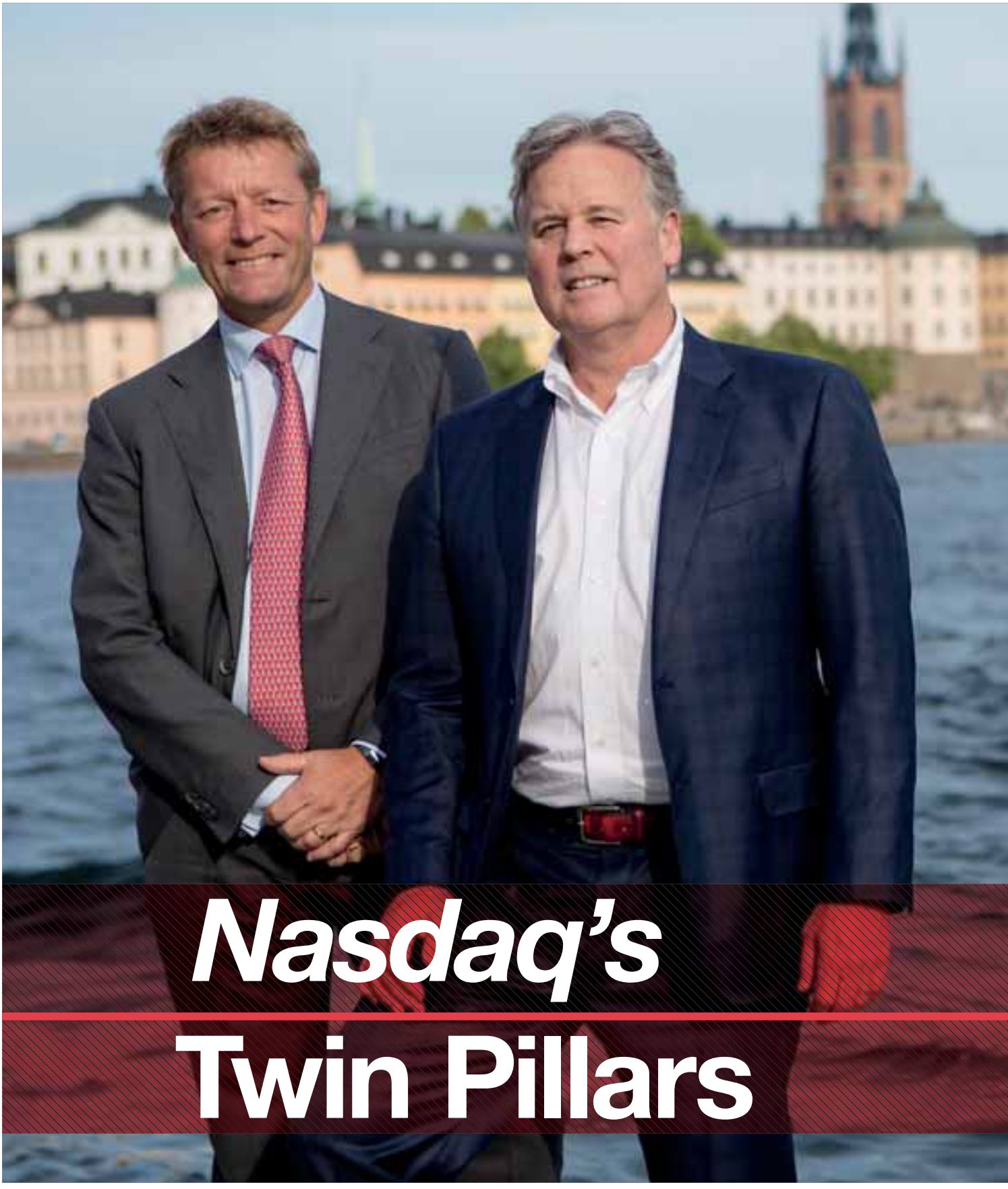
"The financial markets are going to follow these investments into AR and VR because they don't want to be left behind," he says. "Banks are definitely investing in applications but none of those proofs-of-concepts are ready to go into production and the reason for that is the reach of the technology. The technology can only be successful if there's good content; some applications I've seen are so basic, like an ATM-type application, so if there is better content it will really grow."

Firms are not deterred by the drawbacks, however, and as demonstrated by Nasdaq are actively building out technologies to meet specific needs. For Fidelity's Schouela, it's all about anticipating trends and platforms that can communicate information better.

"Years ago we built on the Pebble watch, just in case that took off. That's why we do these things. We really want to understand the technology better and we want to see where it is different from the old technology that we have," he says. "The technology is changing rapidly and it will continue to evolve, so now we're at a time of change, definitely in an experimental phase." W

SALIENT POINTS

- AR, VR and MR are all interesting technologies that offer exciting possibilities to improve communication and data visualization for banks.
- But projects around the technology for financial services will not reach production status for a few more years as the devices continue to evolve and use-cases still need to be refined.
- The cost and distribution of the devices are also issues banks have to figure out for the technology to take off.



Nasdaq's Twin Pillars

Lars Ottersgård and Brad Peterson

In a period where most stock exchanges are facing uncertain futures and are eyeing consolidation with rivals, one of the world's largest is hitting its stride, and feeling comfortable with its own dual nature. By James Rundle

Brad Peterson's

brush with high finance was, by all accounts, an exercise in patience.

John Reed, who would become Citi's storied CEO and chairman, had recruited Peterson's father from the Ford Motor Company in 1970, the idea being that bringing people from outside financial services into the industry would inject fresh views on how to adapt to a changing world.

But for the younger Peterson, the questions of finance's complex relationship with technology were far from his mind. "I remember being in Reed's office, shooting paper clips into the ceiling when I was 12, thinking 'why is my dad working on Saturday?' Now, years later, I get it—working in tech is a round-the-clock job," he recalls. Indeed, little did he know, then, how that scenario would come full circle for him later in life.

Californian by birth, the future CTO and CIO of Nasdaq had always been surrounded by technology, from when his father told him, in the 1960s, that computers would be in cars one day, through to his time at UCLA, where the first node of the internet was being created. Degrees in electrical engineering and post-graduate qualifications from MIT followed, but Peterson first went into the telecoms industry, where he worked on the 2G cellular web standard.

Stints at Charles Schwab, where he built the company's first WAP-enabled application, as the CIO of Epoch Securities, later acquired by Goldman Sachs, and as the CIO of eBay shortly before its purchase of PayPal came after. He returned to Schwab as its CIO in 2008, before Nasdaq came knocking, five-and-a-half years ago, with the offer of a job running its technology from New York.

A Technology Company

It would have been a hard job for any technologist to turn down—few names are as synonymous with technology in the capital markets as Nasdaq. Now the second-largest exchange in the world by market cap, it was founded in 1971 by the National Association of Securities Dealers, from which it

draws its name, with the objective of being the first fully electronic stock exchange. Since then, it's become the natural home for the tech industry, boasting by far the greatest number of listings for technology companies across a range of sectors.

Stock offerings are only one part of the company, however. It is one of the few exchanges that still truly straddles the divide between market provider and market technology provider, with both aspects being intrinsic parts of its core identity. "I think there are a lot of companies that are saying they're technology companies, that are not," says Peterson. "But I would say, for Nasdaq, we check the box. We're a technology company."

Exchanges, like banks, are rarely known for their simple corporate structures. Whether it's the use of somewhat arcane executive ranks—see the London Stock Exchange's chief of staff role, as an example—or their global distribution, it can be hard to get a sense of how an organization prosecutes its development and use of technology. Nasdaq is no different, but to understand how deep technology runs in the fabric of the institution, it's important to understand how tech is operated within the company.

As CIO and CTO, Peterson is responsible for Global Technology, and commands a staff of roughly 1,800, including contractors—or approximately 40 percent of Nasdaq's workforce. He is fully responsible for delivering technology for the internal needs of Nasdaq's operations, but also to the external-facing arm of the exchange group, known as Market Technology.

This division, acquired through the merger of Nasdaq with Sweden's OMX Group in 2007, is led by Lars Ottersgård, head of Market Technology. It is responsible for seeing to the needs of all the exchange's many external technology

clients. Ottersgård himself is a study in contrasts to Peterson. Born in the Swedish town of Växjö, he grew up in Eskilstuna, located about 75 miles from the capital, Stockholm, and jokes that he is from an "uneventful background."

He didn't go down the traditional route of a college undergraduate degree in engineering or computer science, but had four years of technical education in high school. Instead, he joined IBM, where he spent nearly 20 years in a variety of roles, beginning as a technician, and later moving into sales. He moved to OMX Group in 2006 and has remained with the company ever since, eventually being promoted to his current role in 2014, running the exchange group's vendor arm.

Thriving Business

That business is thriving. It supplies banks, brokers, other exchanges, regulators and, increasingly, buy-side firms with a number of technologies, ranging from the matching engines through to post-trade software, and risk and surveillance products, including its popular Smarts platform.

That it has lasted as long as it has is something of an oddity in the world of modern securities exchanges—while in the early part of the Millennium, most venue operators, including the London Stock Exchange, the Chicago Mercantile Exchange, and its then-arch rival, NYSE Euronext, operated vendor arms, most have since pared back their offerings, internalized their structures or eliminated them altogether.

Not so with Nasdaq. According to its 2017 full-year filings with the US Securities and Exchange Commission, Market Technology had an order intake of $292 million, growing from $276 million in 2016 and $271 million in 2015. In addition, the technology sold to clients is broadly the same as that used by the exchange itself, the origins of that decision being a key factor in explaining why it has continued to succeed in this dual role where its rivals have pulled back.

Back in the early 1990s, what was then the OM Group found that it had a problem—it wanted to build out an options trading venue for the Swedish market, but found that there was a distinct lack of suitable software for sale. The decision was taken to build internally instead, and almost immediately, enquiries from other exchanges began rolling in. "The first market that was using our own technology was the Wiener Börse," says Ottersgård. "And so we built this technology to be deployed in a configurable manner to support many different market models and markets."

Fast forward to the present day, and it has grown enormously from its relatively humble beginnings, through expansion, the merger with Nasdaq, further acquisition and development. Still, executives say, the focus on maintaining that approach—building in a way that can serve external clients while also solving for internal problems—is key. "That is in our genes, it's the background for both [OMX and Nasdaq], and we see that building technology for this industry that has been a core

"I remember being in Reed's office, shooting paper clips into the ceiling when I was 12, thinking 'why is my dad working on Saturday?' Now, years later, I get it—working in tech is a round-the-clock job."
Brad Peterson, Nasdaq

competency and then we are really strong in deploying this technology to other markets, or using it for our own markets," says Magnus Haglind, head of product management in Market Technology, who serves as Ottersgård's right-hand man along with risk and surveillance head Valerie Bannert-Thurner, and head of sales Paul McKeown.

Identifying Opportunities

While Market Technology has its own technologists, it relies almost entirely on Global Technology and Peterson's developers to fulfill its requirements, driven both by client demand and a need to remain ahead of the curve. Around 1,100 staff directly support Market Technology, he says—which includes 880 from Global Technology.

That, in turn, has informed how decisions are taken to develop technology at Nasdaq as a whole. Whereas when he first joined, Peterson explains, most decisions to develop were driven by internal requirements, it is now a mix of that and requests from Market Technology that inform the direction of future efforts. "I would say it has changed over time," he says. "So, it was predominantly internal-tech-team-focused and then delivered externally for Market Technology and its clients. Now our approach is bilateral in nature—it can come from both ways, which is great. And some of it is that we're finding, because we're a global company with clients and tech hubs worldwide, we can go where the regulators, clients and partners are ready to collaborate with us on new innovations. So we look for opportunities for being able to deploy new technologies both with our external Market Technology clients and our own markets."

Despite this, the approach to how the exchange engages with these technologies is relatively arms-length in nature. "We operate in a pretty conservative industry, and are highly regulated, so from that standpoint there's not an interest in rocking the boat too much. However, as a technology company that also runs our own markets, it's on us to throw new concepts against the wall to see what may stick and evolve capital markets technology to its next phase," says Haglind, a point echoed by Peterson, who says timing is often critical. "That's what, most of the time, you get wrong. You have to understand that there's that whole cycle of where are you on the early adopter curve versus being too late," he says. "So, first of all, we make our list of things that we think are going to be most important for us. And it's usually from an opportunity standpoint predominantly, and then we also look out for, if we're too late, which one is going to likely disrupt us the most."

Reluctance

Part of this slight reluctance to go the whole hog is due to regulatory attitudes, but also perhaps flavored by missteps from the past, as well. For instance, around the start of the decade, Nasdaq attempted to launch a cloud platform, FinQloud, for the financial industry. However, the key targets weren't willing to commit at that point. Parts of the technology became other platforms within Nasdaq, and Amazon used some of it to build out its financial marketplace, but the risks of being too far ahead of the curve were evident from that experience. Other attempts to put mission-critical functions on the cloud also fell flat. "We were an early adopter of the cloud, and we were able to get an application for ourselves and our clients through our regulator to do archiving in the cloud. And then we tried to move risk products to the cloud for a couple of the big banks and they were not ready at that point." Peterson says.

For Nasdaq, the current pipeline of emerging technology, in order of time to impact and maturity, looks something like cloud computing, followed by artificial intelligence (AI), then distributed-ledger technology (DLT), then quantum computing. It is examining all of them, even if, as Ottersgård says, some of the more radical promises of technologies like DLT seem like they won't materialize any time soon. While it sees promise in DLT, he says, much of the hype surrounding it is "probably a bit exaggerated."

Machine learning, however, is a different story. The exchange is already using it extensively in its internal processes, but its most visible efforts to date have been through its July 2017 acquisition of behavioral science specialists Sybenetix, and the deployment of machine learning for market surveillance on its Nordic exchanges. In April 2018, it announced, true to past form, that it would be licensing the same technology to Hong Kong Exchanges and Clearing.

"I actually believe that AI will have a bigger impact on the industry maybe than DLT," says Haglind. "We are really engaged with it and I think with stronger advances in machine power, like with quantum computing coming, it will have an even bigger impact as you move forward. They are becoming available as compute power gets stronger. So you will see the capability of AI increasing and we are working on it in several areas."

This idea of various components working together, rather than being taken in isolation, with cloud as a foundational technology is a key part of Nasdaq's thinking when it comes to its modern approach to development. In no area is this better expressed than with the Nasdaq Financial Framework (NFF).

The Financial Framework

Launched by then-COO, now CEO and president Adena Friedman in 2016, the NFF is a common platform on which all Nasdaq technology runs. Applications are built on top of the framework, with clients able to do the same, rather than building full-stack software packages in isolation. "I think it is a fundamental shift of what we're doing," says Ottersgård. "When we started this whole NFF journey, it was to put all of our capabilities on one common stack, to ease integration, to ease data management and so on. But we have, in the past couple of years, come to the conclusion that deployed software is not the future. So now NFF is becoming a platform which can be both deployed on-premises where needed, and as a platform-as-a-service to provide services where needed, whether that's to our internal markets, or to the external clients we have."

Indeed, the broader scope of what the NFF could offer is something that has technology executives at the firm palpably excited. Rather than just being a "point solution," Haglind says, it will form "the backbone of a broader compute and data platform." Peterson, for his part, describes the potential for NFF to become "a new architectural paradigm," both within Nasdaq and for external clients.

Magnus Haglind

Possibilities discussed for how this could play out include provisioning full exchange trading systems and data architecture without the need to build expensive physical datacenters to house the matching engines and order-entry systems, or providing new ways to take in and analyze data from trading activities in a range of mission-critical functions. "One of the reasons for this is that we believe in the connected world, where you build ecosystems that can share common platforms, common technologies. So you can do it locally, in your own microcosm, and you can do it regionally," Ottersgård says. "The ultimate belief is that there's a need to connect markets across the globe, over time. We see NFF being a foundation, not only to ease the implementation, integration and data management of our different applications, but actually a platform for managed services and solutions, as well as connecting ecosystems."

Such ambition, of course, requires talented people in order to accomplish—a problem that doesn't seem to faze Peterson. At a time when banks, buy-side firms, brokers and nearly all other market participants are keen to bemoan the lack of talent available to them, Nasdaq seems remarkably unconcerned about any potential talent drain.

Peterson, for instance, has access to MIT's externship job postings, which are only open to alumni. Interest in Nasdaq's projects at the university, from which it recruits its machine intelligence team, has skyrocketed. "We participate in the January externship and summer internship program. We first started that five years ago," he says. "We posted four jobs and received 40 resumes. The next year we posted 10 and received 80, and now we've posted 10 positions and we got 124 resumes. For the January externship program, we are one of the largest hirers, right alongside the big tech firms."

The Future

Discussions about technology at stock exchanges often focus on the speed of matching engines, the cost of market data, or microsecond-level latency reductions, which, while important, can be a sideshow when considering the broader picture of technology development.

Looking ahead, in addition to DLT, cloud, quantum computing and other emerging technologies, including the potential use of augmented reality for surveillance in the NOC, its market control center located in midtown New York, Nasdaq has been keen to stay close to its historic core base—technology companies—in order to inform its future direction. It has also looked to other industries, as John Reed did all those years ago when he hired Peterson's father from Ford, to help it understand where it needs to take action, and where it could improve in the modern era.

What all of this ultimately comes back to is determining Nasdaq's future position in an industry undergoing enormous change, both due to market forces, but also due to technological advancement. As the company begins to hit its stride in its dual identity as a vendor and as a venue, Ottersgård says, it also sees itself as being a part of that change.

"It's like the old saying from Henry Ford, where he said if he asked the people what they wanted, they would have said faster horses," he says. "We can't just solve for short-term problems, we have to be the figureheads and the thought leaders for what the industry is going to need in the future." W

Trading Places

The 2017 Waters Rankings was all about double winners with no fewer than six companies winning two categories each. This year that number dropped to four, although a number of entrants traded places by emerging top in categories they hadn't previously won.

This year's Rankings lunch, held on July 12 at The Players social club in New York featured four double winners—Bloomberg, Thomson Reuters, IPC Systems and S&P Global Market Intelligence—two fewer than last year's awards, with Bloomberg and Thomson Reuters repeating their multiple wins from the 2017 Rankings. And while some winners continued to dominate certain categories—Bloomberg (best sell-side OMS provider), Thomson Reuters (best low-latency data feed provider), Numerix (best market risk solution provider), Eze Castle Integration (best cyber-security provider), Charles River (best buy-side OMS provider) and IPC Systems (best trading floor communication system provider), a number of previous winners traded places by winning new categories this year, including StatPro, Tradeweb Markets, SmartStream Technologies, and Electra Information Systems. But this year, one firm—IPC—stood out above all others by once again claiming the title in the best trading floor communication system provider category, its 13th win on the bounce, an astonishing feat by any measure.

Last year's Rankings attracted a record 495 entries, a number not quite matched by the 468 entries we received this year. Write-ups by Hamad Ali (HA), Josephine Gallagher (GA), Emilia David (ED), Wei-Shen Wong (WSW), James Rundle (JR) and Victor Anderson (VBA). W

Victor Anderson
Editor-in-Chief, *Waters*

Winners' Circle

In July, *Waters* readers gathered in New York to celebrate the winners of the Waters Rankings.

Best Agency Broker

Weeden & Co.

The best agency broker category at the Rankings has traditionally been dominated by familiar names: Bloomberg, whose Tradebook subsidiary won it for the past three years, ITG, Instinet and ConvergEx. All of these are high-profile, hard-charging firms that appear regularly in the pages of *Waters*.

Not so much Weeden & Co., which wrests the title from Bloomberg this year. Based in Greenwich, Conn., with offices in New York, Boston, Chicago and San Francisco, the firm is traditionally quiet in the media aside from a number of TV spots—a Google search picks up a *New York Times* article from 1975 about the agency brokerage moving out of Manhattan, and a *Traders* article from 2016, which spends much of its time dealing with how low-key Weeden likes to be. Its Twitter feed has sat silent since May 9, 2016.

Still, it's a fascinating firm—structured as a partnership, it is fully owned by its employees past and present—and one that continues to outperform the market. Recently, it was ranked first in multiple categories for the Greenwich Associated Portfolio Trading software—the 15th year that it has been so—and in many of those categories it came first. It has an agency-only model, and advertises the fact that it is free from conflict by not operating a proprietary trading desk, or an internalized dark pool. It offers brokerage in equities and equity derivatives, and its affiliate companies—Weeden Prime, which as the name suggests, caters to hedge funds; Pragma Trading, which offers algorithmic-trading technology; and research firm The Leuthold Group—broaden its scope beyond simple execution. Founded in 1922, it is approaching 100 years of operation, and was famously (albeit in Wall Street circles) started with a $25,000 loan from the father of its founder and namesake, Donald E Weeden. The firm now counts over 1,500 institutions as clients.

As expected from a firm that values its privacy—true to form, it proved impossible to arrange an interview with an executive for this article, despite multiple attempts to do so—it rarely releases news to the media. However, last year, Weeden enhanced its electronic trading bona fides in June 2017 by incorporating the use of conditional order types into its strategies. It also undertook a "complete rewrite" of its Pairs platform, which gives clients the ability to choose between volume- or time-weighted averaged price strategies, volume participation and more aggressive trading. It further added a "stealth mode" option to its Onepipe dark-pool aggregator.

—JR

Weeden & Co. has an agency-only model, and advertises the fact that it is free from conflict by not operating a proprietary trading desk, or an internalized dark pool.

Best Crossing Network Provider

OpenDoor Trading

It's been a busy time for OpenDoor Trading, which completed its maiden year of operation in April. Billed as an all-to-all, session-based trading platform for off-the-run Treasurys, the venue has continued to grow in terms of participants, activity, and funding—it completed a $10 million funding round in January—bulwarked by the release of version 2.0 of the platform in April 2018. "We've also seen actual order volume and trading volume uptick quite significantly over the past several months," says Josh Holden, CIO at OpenDoor. "If you just look at average daily order volume, that's up 400 percent roughly from what it was the year previous. We have actual executed trade volumes in terms of average daily volumes up—those are up about 300 percent."

Most heartening, Holden says, and what validates the platform's approach, is its growth in buy-side-to-buy-side matching. When the platform launched, the number of trades in that segment hovered at around four percent—today, around 20 percent of total matches on the platform can be attributed to buy-side-only activity, a fair proportion of which has transpired since it completed its first year of operation. "We've heard it for years in terms of how we developed the platform—that the buy side really would like to be both liquidity consumers and liquidity providers, and would like to match off with each other, as some of the dealers have stepped back from the space," Holden says. "To see those numbers actually tick up like that and to see that mix of business happen is a validation of the fundamental premise of the model, which is that an all-to-all marketplace can really help in some of these less liquid parts of the market."

Other technical work this year has focused on the integration of OpenDoor with third-party platforms, including order and execution management systems. The banner integration to date has been with buy-side stalwart Charles River, but a number of others have taken place that the company has not yet announced. OpenDoor has also been an active participant in the interoperability initiative led by OpenFin, which aims to create an operating system for financial-market technology.

Looking ahead, Holden says, OpenDoor will be examining the possibility of more frequent matching sessions—it currently offers three per day—but that will require some coordination with existing and future participants to get off the ground. "You can't bring people on one at a time and have them experience no trading and then go away unhappy," he says.

—JR


Marie Patton

> When the platform launched, the number of trades in that segment hovered at around 4 percent—today, around 20 percent of total matches on the platform can be attributed to buy-side-only activity, a fair proportion of which has transpired since it completed its first year of operation.

Best Reconciliation Management Provider

Broadridge Financial Solutions

The best reconciliation provider category in the Waters Rankings has witnessed some stiff competition in recent years, driven by feedback from *Waters*' readers. Until recently, Electra Information Systems was the clear leader in this space, having won the category for the past two years thanks to its reconciliation offering formerly known as OpenSTaARS. But there have been a number of providers snapping at Electra's heels, and this year it is Broadridge Financial Solutions in the winners' circle of this ever-competitive category.

The New York-based technology provider entered the reconciliation market on the back of its acquisition of City Networks in 2010. City Network had been active in the reconciliation and connectivity markets for a number of years prior to its acquisition. According to Philip Taliaferro, head of strategy for EMEA and Asia Pacific at Broadridge, entering the reconciliation market was a natural move for the firm, because on the sell side and in the wealth management space it sits adjacent to the firm's post-trade offering, which constitutes a significant part of its day-to-day activities.

The platform offers real-time monitoring, alerts and early detection of anomalies. "Our platform can be used for a variety of different asset classes and deployed in different scenarios," Taliaferro explains. "To give some real examples, our product is used for over-the-counter derivatives, repos, front-to-back-office and custodial data aggregation."

Taliaferro cites Broadridge's deployment flexibility as one of the firm's competitive differentiators, ranging from on-site installations and inside of a client's datacenter to the Broadridge-hosted ASP model, in the cloud, and as a fully-managed service, which can be deployed anywhere.

According to Taliaferro, the company rolls out three major releases of the platform each year, as well as patch releases and fixes if and when they are necessary. It has worked with cloud technology for approximately one year and is looking to incorporate artificial intelligence and robotic process automation into the offering to replace human intervention. "With the pace of regulatory and business change, there is a desire for users to be able to self-configure reconciliation," says Taliaferro. "Our platform allows that, in fact encourages that. So we train users how to build their own [reconciliation processes], and with the assistance of our team, get those tested and promoted into production. It reduces the need for an operations team or a control function that relies on a central IT team to help them build reconciliation in order to respond to regulatory or market changes."

—HA

Raghu Kottamasu and Philip Taliaferro

> "Entering the reconciliation market was a natural move for Broadridge, because on the sell side and in the wealth management space it sits adjacent to the firm's post-trade offering, which constitutes a significant part of its day-to-day activities.

Best Algorithmic Trading Provider

Wolverine Execution Services

Perhaps one of the most important innovations of the modern era has been algorithmic trading. Electronic trading platforms paved the way, certainly, and early forms of automated order entry provided the catalyst for what would become the foundational trading method of modern markets, but the development of algorithmic trading itself has been a fascinating—and at times, controversial—evolution in listed markets.

Wolverine Execution Services (WEX) has been at the forefront of broker-supplied algorithms over the past several years, and becomes only the second firm to win consecutive awards in this category in the Waters Rankings—the other being Instinet.

The Chicago-based firm's suite of execution services offers an array of strategies across three main asset classes—equities, futures and options. Its flagship algorithm is Best-X, a strategy that can operate across all three, including single and complex futures, which the firm says relies on a proprietary predictive model to minimize market impact and price slippage.

Other strategies at the finger (or fiber) tips of its clients include Sweep, an algorithm designed to immediately access available liquidity and determine order routing based on the probability of successful execution; Vol, which allows for user-determined aggression levels; and Delta Adjusted, which links option price bands to the underlying securities, primarily determined from user-provided option delta.

More traditional algorithmic strategies are also included in the suite, such as Time-Weighted Average Price (TWAP) and Volume-Weighted Average Price (VWAP), while Wolverine also offers the Portfolio-X algorithm for equities. This uses Best-X logic and historical volume data to determine execution for baskets or index components, while minimizing price slippage.

The firm has followed up its voice-electronic hybrid request-for-quote mechanism, released to fanfare in 2017, with a fully electronic execution and compliance process for qualified contingent cross (QCC) orders. Announced in July 2018, this allows clients the ability to submit orders through WEX via a QCC route that eliminates exposure to other participants, while maintaining an audit trail. Such orders must be 1,000 contracts or more and be priced equal to or better than the national best bid or offer, and has been made available via FIX, and third-party execution management and order management systems. "Throughout its history, WEX has continually taken complicated execution processes and simplified them," says Troy Googins, head of WEX product and new business development. "Our QCC routes are yet another example of WEX providing clients with a streamlined execution solution."

—JR

Wolverine Execution Services has been at the forefront of broker-supplied algorithms over the past several years, and becomes only the second firm to win consecutive awards in this category in the Waters Rankings.

Best Artificial Intelligence Technology Provider

Sentieo

As an emerging technology, artificial intelligence (AI) has dominated headlines in recent years, even though some have dismissed it as a mere marketing tool. But there is no denying the significant value offered by AI and its huge potential for the capital markets, given its ability to outperform humans by processing and analyzing huge volumes of data in significantly reduced timeframes. This technology is ever more important at a time when the industry is experiencing an explosion of data, and analyst teams are struggling to keep up.

Sentieo, a research platform and a relatively new kid on the block, has made large strides in this market in order to address these challenges, winning this year's best AI category in the Waters Rankings. Since its launch in the final quarter of 2015, the firm has continued to develop the platform's functionality, utilizing natural-language processing to help users search for and analyze linguistic data within its extensive database of global financial documents. Last year, it introduced the ability to analyze and extract sentiment from transcripts using AI, enabling analysts to consume data more efficiently and make better-informed investment decisions.

Rishi Mohnot, vice president of business operations at Sentieo, explains that over the years, financial data has become more readily available and easier to comprehend, whereas technologies used to process linguistic data have fallen behind. "We make that linguistic data more easily accessible and help analysts to become more efficient in analyzing it," he says. "Through document search and specifically with the transcript sentiment feature, we are making it easier [for users] to understand the underlying meaning of documents without having to carefully read every line."

Sentieo launched its cloud-based research management system (RMS) in July this year. This latest addition can be integrated into the research platform and utilized to track activity across investment teams, harmonize workflows, enable collaboration, and automate compliance requirements. The RMS includes the Sentieo Notebook, a workspace where multiple users can organize their research from any device, work across the same documents, and analyze the decision-making process from its activity logs. As part of its research suite, the platform also offers multiple datasets, including alternative data.

As the platform continues to develop, Mohnot says one of Sentieo's next moves is to enhance its ability to extract data from unstructured documents using machine-learning technology. Over the next 12 to 18 months, Sentieo also plans to grow its team and expand into existing markets, with a primary focus on the buy-side community.

—JG

Geoffrey Suen and Alap Shah

> Since its launch in the final quarter of 2015, the firm has continued to develop the platform's functionality, utilizing natural-language processing to help users search for and analyze linguistic data within its extensive database of global financial documents.

Best Sell-Side Order Management System Provider

Bloomberg

The order management system (OMS) space tends to be associated more with the buy side, thanks to its dominance by a few big names—Charles River, Eze Software, Linedata and others. But the one company that truly crosses the Rubicon at scale between the buy and sell sides is Bloomberg. For the buy side it has its AIM product, but for the sell side, TOMS is the standard for many broker trading floors.

With over 300 clients, business is booming for the platform, which has had its traditional heartland in the cash and bonds space. Much of the focus, as with any providers of sell-side technology, has of course been on the implementation of the revised Markets in Financial Instruments Directive (Mifid II) in Europe.

One example of how TOMS reacted to the new regulation was with its sales trader workflow, which records the negotiations between salespeople and clients, providing an auditable record of interactions in compliance with Mifid II's various provisions. Over the past few years, however, a dedicated program of investment has seen TOMS expand its asset class coverage, pushing into the world of derivatives and other exotic instruments. "We're a considerably more powerful derivatives system now than we were a few years ago, and that continues to develop as we invest," says Phil McCabe, global head of product for TOMS at Bloomberg. "For instance, over the last 12 months we've continued to look at how the user interface explains things like delta, vega and other risk [measures], and how we explain that to our customers through the front-end piece."

The company has also built in functionality for calculating XVAs—adjustments made to the fair value of a derivatives contract to take into account funding, credit risk and regulatory capital costs, which McCabe says are now regarded as an "intrinsic" aspect of pricing derivatives trades.

Looking ahead, the further integration of TOMS with other aspects of the Bloomberg stable—as well as third-party systems—is a key objective, in order to realize the potential of a "genuine enterprise system," as McCabe puts it, along with expanding its firepower in data analytics. "We don't sell software, we sell connectivity, and Bloomberg is absolutely an integral, central part of financial markets," he says. "So when I'm plugged in to data, I'm plugged in to reporting, I'm plugged in to analytics, I'm plugged in to insights, to news. I think that's real, key stuff, in terms of being able to trade and really knowing what's going on, and really understanding why the market has moved. I think that's what it takes to win."

—JR

Lisa Bravo and Peter Levesque

> With over 300 clients, business is booming for the platform, which has had its traditional heartland in the cash and bonds space.

Best Buy-Side Order Management System Provider

Charles River Development

Buy-side firms are facing fee compressions, forcing them to cut costs and reinvent their investment product pipeline in order to remain competitive. They're also dealing with pressure from regulations such as the revised Markets in Financial Instruments Directive (Mifid II). Charles River Development, which wins the best buy-side order management system provider title at this year's Waters Rankings, thanks to its Investment Management System (IMS), deployed its end-to-end Mifid II solution featuring trade and transaction reporting, commission management, and best-execution analysis capabilities to clients before the Directive's January 3, 2018, deadline. The Burlington, Mass.-based provider has also helped clients cut costs via its software-as-a-service (SaaS) offering, allowing them to simplify operating models across the front and middle offices. This results not only in reduced total cost of ownership but also ensures up-to-date system capabilities, enabling firms to better handle new market requirements. The platform allows firms to consolidate disparate point solutions onto a single platform, reducing the operational risks associated with siloed systems and various data sources.

Tom Driscoll, managing director at Charles River, says the SaaS-based platform provides firms with frequent software upgrades, managed reference, security, pricing and corporate actions data, and the latest cybersecurity safeguards. Its on-premises clients receive three major releases per year. He adds that Charles River invests significantly in R&D and its teams are constantly monitoring the industry and new technologies to ensure the platform best reflects the industry's trends. "In some cases we build in new technology such as our browser and mobile front-ends, in addition to our traditional desktop front-end," Driscoll says. "In other cases we partner with innovative technology providers, trading venues, and algo providers to integrate their offerings."

Looking forward, Charles River will be making "significant enhancements" to its investment book of record (Ibor), order and execution management system, portfolio management and risk analytics functions, and regulation-driven features for its compliance engine and global shareholder disclosure service. Some of the areas the firm is focusing on include enhanced data acquisition and management capabilities, as well as streamlining post-trade clearing and settlement functions with expanded Swift messaging support. Other areas on its radar are collateral management, and real-time net asset value calculations within its Ibor offering. "With the recent news of State Street Bank's planned acquisition of Charles River, Charles River will be more tightly integrating with State Street's back office, asset services (custody, fund administration and fund accounting) and middle-office services, which should significantly benefit mutual clients," Driscoll adds.

—WSW

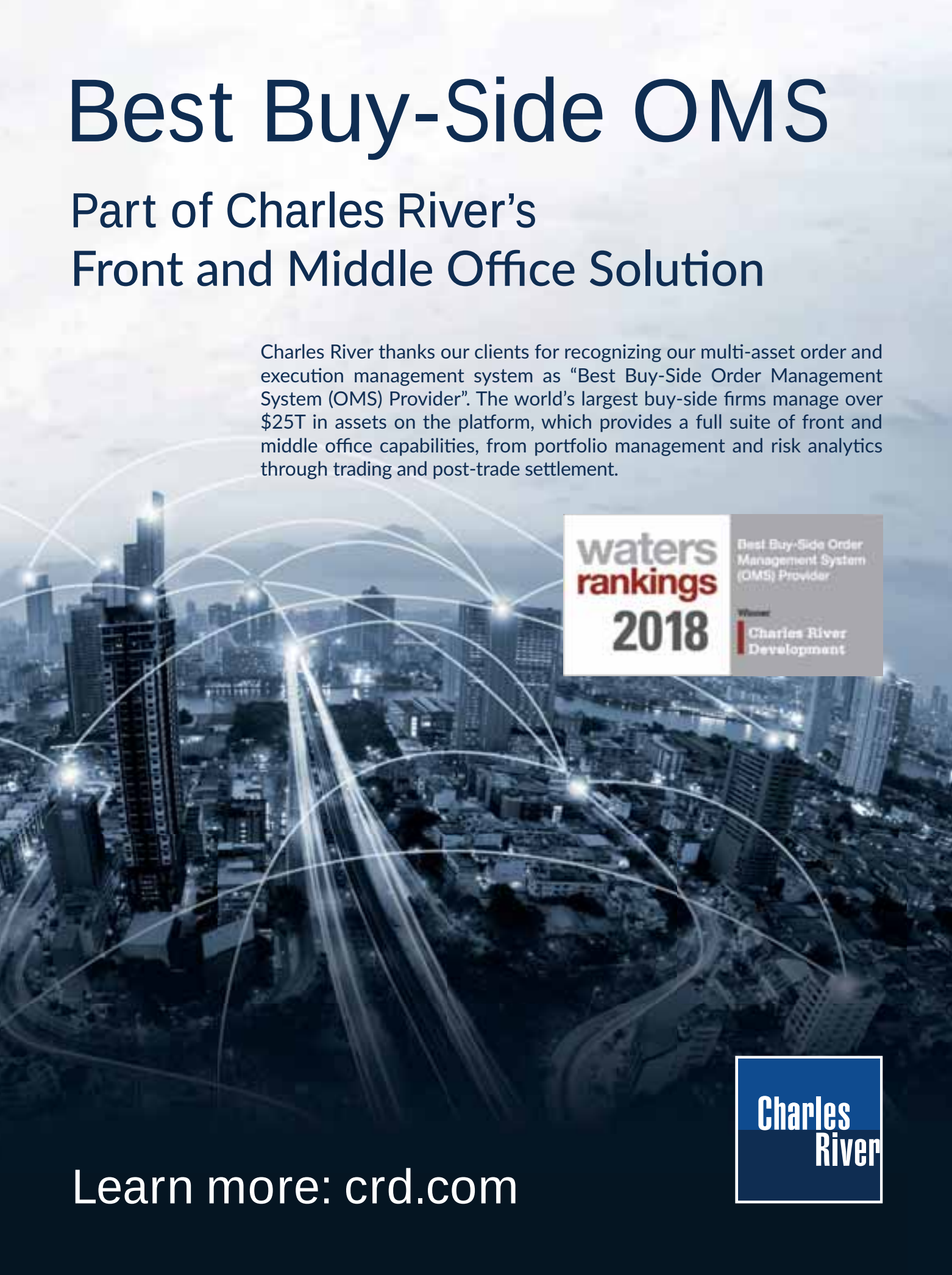
Thomas Izzo and Bryan Bashaw

> "Charles River invests significantly in R&D and its teams are constantly monitoring the industry and new technologies to ensure the platform best reflects the industry's trends.

Best Buy-Side OMS

Part of Charles River's Front and Middle Office Solution

Charles River thanks our clients for recognizing our multi-asset order and execution management system as "Best Buy-Side Order Management System (OMS) Provider". The world's largest buy-side firms manage over $25T in assets on the platform, which provides a full suite of front and middle office capabilities, from portfolio management and risk analytics through trading and post-trade settlement.



Learn more: crd.com

Charles River

Best Portfolio Management System Provider

RiskVal Financial Solutions

RiskVal Financial Solutions has scored a hat-trick by winning the best portfolio management system provider category in this year's Waters Ranking for the third consecutive year. Since the New York-based company wrested the title from Bloomberg in 2016, it hasn't let go.

RiskVal's CEO, Jordan Hu, cites the platform's ability to connect the front and middle offices as an important differentiator compared to many of its competitors in what is a mature and keenly competitive market. "Most of the traditional portfolio management [platforms] solely focus on the middle office," says Hu. "They lack a front-office view of risk and P&L management."

The company has come a long way since it was founded in 2001 by Hu, who brought together talents from Wall Street and academia. The firm's flagship offering, RVPortfolio, is a real-time risk and P&L portfolio management platform featuring a multi-hierarchy framework, allowing portfolio managers to organize their portfolios and evaluate the associated risks within those portfolios at the strategy level, while risk managers are able to aggregate portfolios to book or firm levels.

Hu argues that compared to 10 years ago, middle-office needs have evolved and have had to become more dynamic by adopting various regulatory frameworks like Mifid II. He feels that rather than monitoring risk on an ex-post, end-of-day basis, it needs to be monitored in close-to-real-time to more accurately reflect intra-day market nuances. The platform supports various kinds of risk measures such as bucket risk, scenario risk, stress-tests and back-tests. When a trade is executed it is automatically integrated into RVPortfolio, a platform used by large numbers of prominent banks and buy-side institutions around the world. To keep ahead of the curve, RiskVal has embraced a number of market-leading technologies, including Amazon Web Services for cloud functionality and Bloomberg for market data.

Looking into his crystal ball, Hu foresees a lot of change in the area of risk and portfolio management. "Step number one is to connect the front office and middle office so that they have the same view of risk and P&L," he says. "The second is intelligence. We need to build some deep-learning artificial intelligence into risk management. What is the best way to allocate your risk in order to maximize your profit? You cannot rely on humans—you have to rely on data signs to analyze trades, and then figure out the trade signal. I think the future will entail incorporating data signs with deep-learning capabilities on the portfolio, understanding the risk perspective, and maximizing the risk-reward ratio."

—HA

Ksenia Dominova, Saira Sattar, Jordan Hu, Jennifer Yang Li, and Dima Yedynak

> To keep ahead of the curve, RiskVal has embraced a number of market-leading technologies, including Amazon Web Services for cloud functionality and Bloomberg for market data.

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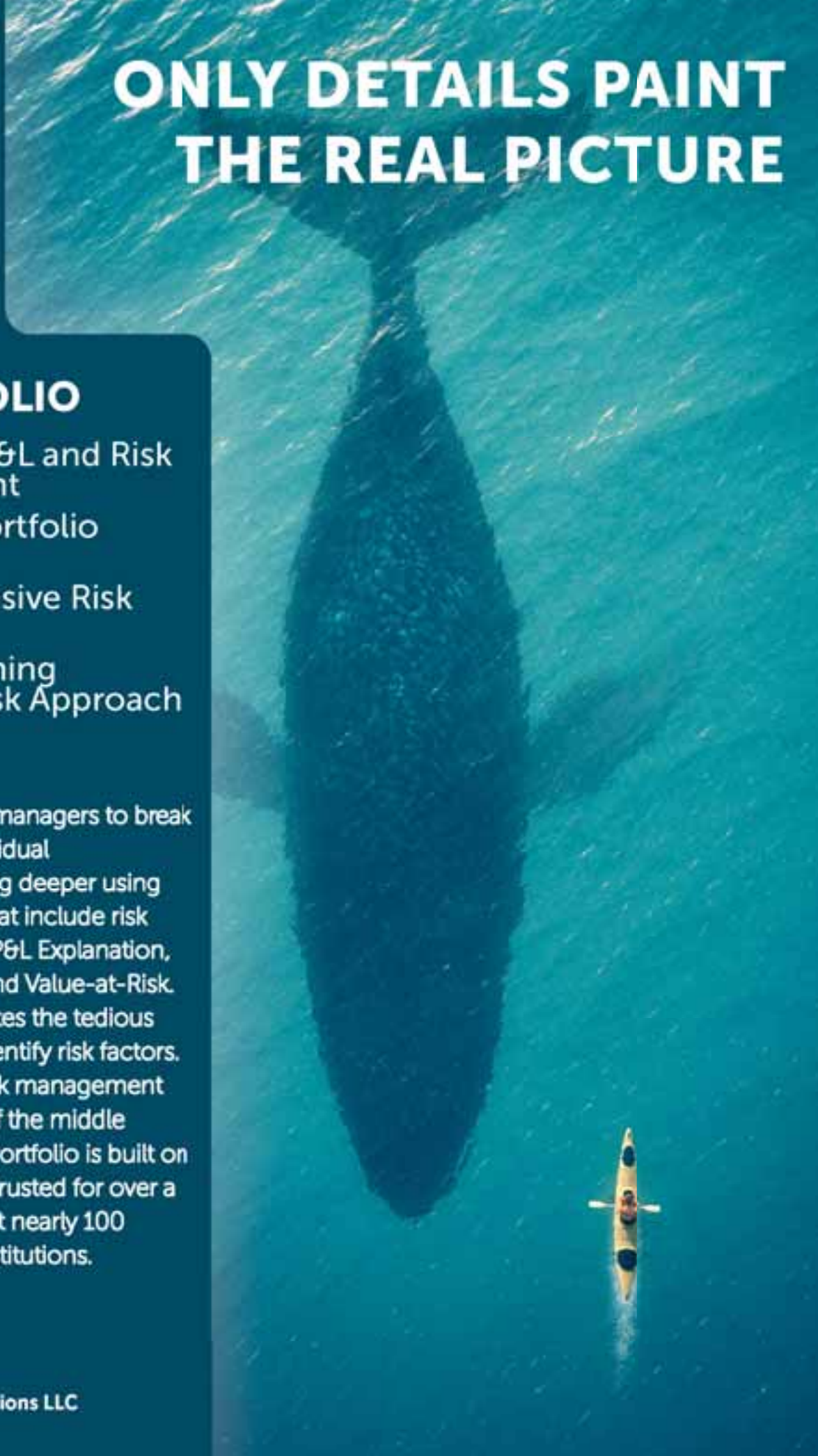

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Riskval.com

Best Execution Management System Provider

London Stock Exchange Group Technology

The hallmarks of any trading management system are reliability and low latency. Seems pretty straightforward, right? Well, not in the context of modern-day trading where technologies are buckling under the pressure of increased transaction volumes while fending off the prospect of system failures. Managing trade orders to ensure best execution is no simple task, but London Stock Exchange Group (LSEG) Technology is leading the way through the continuous development of its flagship product, Millennium Exchange, bagging the best execution management system provider category at this year's Waters Rankings.

Hiran Jayaratna, head of MillenniumIT product management at LSEG Technology, says that Millennium Exchange's track record of resilience and its uptime benchmark of 99.998 percent across all its products has been a sweet spot for growth. He explains that like any piece of technology, system glitches are unavoidable, but that Millennium Exchange's ability to recover rapidly is what sets the service apart from its competitors. As part of the offering, LSEG Technology provides second and third lines of support, in addition to secondary site capabilities in the event of disaster recovery scenarios, where system operations are transferred to back-ups in under 30 minutes. "Reliability is the key differentiator," says Jayaratha. "Reliability and recovery are key because the platform and the software components can be re-started in the event of a failure and can be recovered quickly."

LSEG Technology is exploring the use of machine-learning technology to predict and mitigate the risk of system glitches and outages. This new feature identifies system anomalies based on holistic observations and historical patterns. It is currently being rolled out and built into the Millennium Advance Platform (MAP), a core technology and integration layer that underpins Millennium Exchange and the entire suite of products and services within Millennium Information Technology, covering operations management, market data, post-trade, order routing, and surveillance.

However, reliability and recovery are not the only reasons why Millennium Exchange has grown to prominence in recent years. Exchanges from all tiers have turned to the technology due to its low latency and scalability. Hugh Richards, head of product and solutions management at LSEG Technology, explains that over the coming months the group will continue to develop the product, explore the potential of cloud, and examine demand coming from a new wave of clients, seeping in from the digital space. "Reliability, performance and the fact that these big institutional players are familiar with such platforms is a key thing for the crypto exchanges that are coming down the line," he adds.

—JG

> LSEG Technology provides second and third lines of support, in addition to secondary site capabilities in the event of disaster recovery scenarios, where system operations are transferred to back-ups in under 30 minutes.

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Best Performance Measurement and Attribution System Provider

StatPro

Is there a more crucial business process that buy-side firms need to manage accurately and efficiently than performance measurement? Most would argue that there is not, given that asset managers' futures are largely determined by their performance—the returns they provide their asset owners. Produce returns commensurate with your clients' expectations and you'll attract additional capital, but underperform and you'll quickly realize just how challenging and unforgiving this industry can be.

London-based StatPro understands these challenges better than most, which is why it's no surprise to see it back in the Rankings winners' circle, thanks to its cloud-based, integrated risk management and performance platform, Revolution. According to Neil Smyth, marketing and IT director at StatPro, Revolution Performance, built from the ground up as a cloud-native platform and unveiled in September 2016, has more than pure performance metrics in its DNA. It was, he says, developed to better reflect the day-to-day workflows and challenges facing buy-side firms' heads of performance than simply delivering them with a bigger, better and faster calculation engine. "When we were designing and building the new engine, we thought about the lives and daily processes of performance measurers and how we could make them easier, more efficient and more productive," Smyth says. "Scalability is one thing, but it's not just about the speed of the calculations. We realized that data management and controls consume a lot of time during the performance measurement process. And so we designed a whole suite of data controls—over 90 configurable data controls—that can be applied not only to the input data into performance, but also to the calculated data before you get all the way down to reporting and distribution."

Smyth explains that most performance systems can calculate numbers that are mathematically correct even though they're obviously wrong and can be identified as such by any decent performance measurer. "We wanted to stop incorrect returns from being published," he says. "These data controls bring a level of intelligence and automation [to performance measurement]; they can be configured and applied [in a discretionary manner] to groups of portfolios, allowing the system to automatically spot anomalies, correct them and log the correction in the audit log."

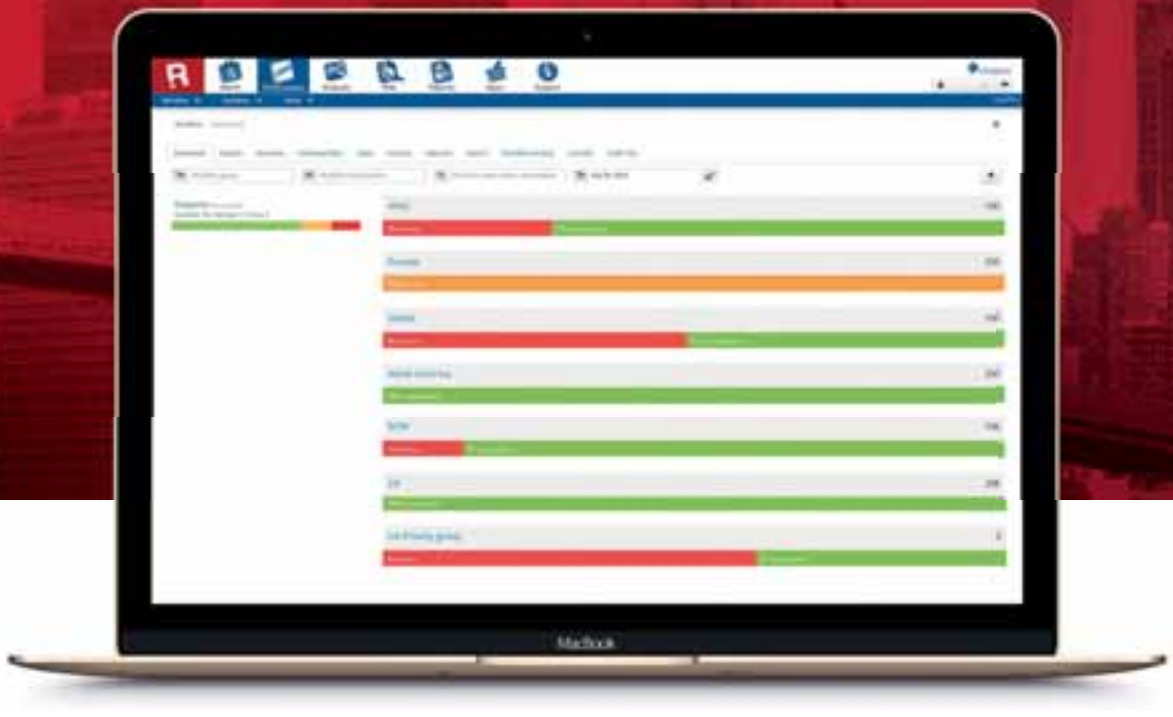
StatPro also focused on the visualization of workflows when developing the new engine, allowing users to see the status of their various portfolio groups as quickly as possible when they arrive at the office in the morning. "They might have high-priority portfolios that they want to pay particular attention to and what we wanted to do was allow them to see the immediate status of those portfolios," he says.

—VBA

Mike Mollenkamp and Steve Powell

> Revolution Performance was developed to better reflect the day-to-day workflows and challenges facing buy-side firms' heads of performance than simply delivering them with a bigger, better and faster calculation engine.

STATPRO WINS THE WATERS RANKINGS AWARD FOR 'BEST PERFORMANCE MEASUREMENT AND ATTRIBUTION SYSTEM PROVIDER'



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Best Transaction-Cost Analysis System Provider

Tradeweb Markets

Transaction-cost analysis (TCA), increasingly a function that capital markets firms are required to manage more accurately and transparently, thanks to the regulatory changes introduced primarily by the revised Markets in Financial Instruments Directive (Mifid II), might not necessarily set pulses racing, although it is nonetheless crucial. But as buy-side and sell-side firms grapple with ever more onerous and complex regulatory mandates, while similarly trying to provide their investors with greater transparency into how and why they made the decisions they did, TCA has become one of the primary means of achieving those aims. This year, Tradeweb wins this category for the first time, thanks to its Tradeweb TCA offering, joining past recipients, FIS (2017), IHS Markit (2016) and ITG (2014 and 2015) in the winners' circle.

Tradeweb unveiled its TCA tool in late 2015, although according to Mike Thorpe, managing director and head of cross-market solutions and relationships at Tradeweb, it had been working on the platform with a number of clients in a piloted phase since 2013. "We began by discussing with a group of our biggest buy-side clients their needs around evaluating their execution costs for the trades they were doing on Tradeweb," he says. "Essentially, we gave them the tools to benchmark where they were trading on Tradeweb against a midpoint of reference prices. The core of the TCA offering comprises a precise, time-stamped reference price and a comprehensive dataset of executed trades. I think they recognized that we had some really good pricing and execution data, so they wanted to know how they could use it to measure the performance of their trades and traders."

Thorpe explains that Tradeweb introduced three enhancements during the second phase of developing the platform. First, he says, the firm extended its asset class coverage from government bonds to include European credit and cash bonds, and more recently, interest-rate swaps. Second, it enabled clients to import non-Tradeweb trades and also to perform peer group analysis, allowing them to compare their execution performance against a peer group. This can be either the whole of Tradeweb's clients, or, if the customer is an asset manager, against those investment firms that use Tradeweb who they can reliably compare themselves to. The third phase focused on facilitating best-execution monitoring. "Clients wanted us to broaden out the service to provide a tool to monitor and evidence best execution, particularly under new regulatory regimes such as Mifid II," Thorpe says.

By winning this category in this year's Rankings, Tradweb has underlined its broad market appeal, especially across the institutional asset management industry, having won the corresponding category in last year's Buy-Side Technology Awards.

—VBA

Sonal Shah and Jeff Bezahler

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Winner
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Buy-Side Technology Awards 2017
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Tradeweb Markets

Best Enterprise Data Management System Provider

S&P Global Market Intelligence

This year's best enterprise data management system provider award goes to S&P Global Market Intelligence for its Xpressfeed offering, besting last year's winner, IHS Markit. Xpressfeed combines a broad range of data feeds for analysis and provides clients with access to various types of content from numerous different providers. While Xpressfeed offers data from S&P's own databases, it also relies on third-party partnerships.

David Coluccio, vice president and head of data management solutions at S&P Global Market Intelligence, says Xpressfeed combines many data sources in order to provide the best possible information to its capital markets clients in a single data warehouse. "Clients have traditionally relied on Compustat, Global Industry Classification Standard (GICS), S&P Ratings, and Capital IQ data for their analysis, but through Xpressfeed, they can now easily integrate this differentiated content that our competitors do not have," says Coluccio. "It's a delivery platform that simplifies the way clients access our data, and the quality of our data is what really differentiates this product."

Coluccio adds that the company ensures that it handles the ETL or extraction, transformation and loading process of data through its loader application and supports multiple database environments. He says alternative forms of data on Xpressfeed include statistics from Panjiva, which provides shipment information, asset-level data provider SNL, and point-in-time financial data, which allows clients to perform back-testing of filing and delivery dates.

He says that S&P also provides hands-on support to clients using Xpressfeed.

The Xpressfeed service taps into more than 200 datasets and market data feeds on 51,000 global companies. It also gathers together credit ratings from different ratings agencies to provide value-added analysis to clients. "Xpressfeed is well positioned to power analysis and model building in a market where we see rapidly changing technology, increased risk and regulatory demands, and the growth of data science capabilities," Coluccio says.

In the past year, S&P has enhanced its value proposition to clients by including new content available on Xpressfeed. It added machine-readable transcripts, PostgreSQL and AWS RDS (Amazon Web Services Relational Database Service) support, and SNL Financial asset-level data to the platform. Coluccio also notes that S&P has added Japanese ratings agencies data and has expanded its credit analytics offering.

But the New-York-based firm is not resting on its laurels. Coluccio says more updates are in the pipeline, including support for additional open-source databases, datasets around environmental, social and governance (ESG) investments, Chinese ratings agencies data, and other third-party data. The company is also looking at adding cloud availability for its clients.

—ED

"We are once again pleased to be recognized by our clients and industry practitioners for our Xpressfeed and S&P Capital IQ platform. Our employees around the world work tirelessly to deliver world-class content, analytics and robust delivery options for our clients. Awards like these reinforce that these efforts and our investments in talent, data quality, and delivery are being recognized by our clients and the industry at large." **Warren Breakstone, managing director and chief product officer of data management solutions, S&P Global Market Intelligence**

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Best Reference Data Provider

Bloomberg

Regardless of whatever else it's known for—a news organization, a software provider, a Terminal operator—Bloomberg is, first and foremost, regarded as an information provider. In the world of reference data, particularly, it's a giant, and it's been ramping up its coverage aggressively over the past year. "Some of the feedback we've had over the last few years is there's a lot of data available on the Terminal and we don't make that available to data license and through real time," says Brad Foster, global head of enterprise data content at Bloomberg. "We've obviously taken that to heart. One of the big shifts from us over the last six-to-eight months has been providing a lot of that data that was previously only available through the desktop and actually providing it to our clients through data license."

This new data includes environmental, social and governance (ESG) and fundamental data. The scope of expansion has been enormous—Foster points out that over the past year, the number of reference data fields the vendor covers has more than doubled, ballooning from 15,000 to around 40,000 fields.

Bloomberg will continue to expand the datasets it offers, Foster says, but it needs to be "selective" about how it pursues that objective. There is the risk of falling into the trap of providing data on an ad hoc basis according to individual requests, which is a path that the company doesn't necessarily want to go down. However, with enough demand, he says, expansion in licensing is a practical possibility. "We still want to be cautious around how we do this, and we want to make sure that we're solving for client needs generally," he explains. Examples of this could include some of the alternative data currently being requested by quant firms. But looking ahead in a more strategic sense, Foster continues, the real value will be in showing how the data links together, rather than just serving it up piecemeal. "I think what clients are looking for, more and more, is our ability to work with them to start connecting different datasets. You look at our clients' need for historical data—certainly for quant funds, they need multiple years of history and they need as much data as you can provide them. When it comes to other use-cases, it's about connecting things like supply chain data to default risk data, the probability of defaults and loss given default. All these things feed into our one data offering, our one data proposition, where we want to be that one data provider to our clients."

—JR

Gregory Van Droogenbroeck and Maureen Gallagher

> "Looking ahead in a more strategic sense, the real value will be in showing how the data links together, rather than just serving it up piecemeal.

Not all our clients think the same. But they agree on two things.

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Best Sell-Side Order Management System (OMS) Provider:
Bloomberg Trade Order Management Solutions (TOMS)

Best Reference Data Provider:
Bloomberg Reference Data

waters rankings 2018

Bloomberg

Best Corporate Actions Solution Provider

SmartStream

Understanding the underlying data that resides within the corporate actions market would leave most people scratching their heads, let alone managing the processes involved in carrying out corporate actions operations. This is a complex procedure by any measure, but the need for such services has risen to prominence over the years as the industry seeks to standardize business processes, automate workflows, and mitigate the risk of missing events that could impair investment decisions and positions.

SmartStream has experienced significant growth in this space and it is no surprise that it has been returned to the winners' circle by *Waters*' readers, reflecting the development of its TLM Corporate Actions platform. Adam Cottingham, product manager of TLM Corporate Actions, explains that SmartStream dedicated two-and-a-half years to grow its corporate actions processing business, starting with the redevelopment of the platform from the ground up, utilizing Agile projects to continuously evolve the technology. Targeted at both buy-side and sell-side firms, the platform offers a diary management approach to processing all ISO event types, in real time, throughout their lifecycle. "It's a real-time processing engine that covers the complete event lifecycle from announcement capture to golden record management, position management, event broadcasting and communication, election management, entitlement-generation and posting," Cottingham explains. "You have a technology that supports all of those processes, but it also involves the processing logic, which is a mixture of industry standards and experiences within our client base."

One of the biggest steps undertaken by SmartStream in the development of the platform was the introduction of a model client configuration, an implementation model that can be tailored to each client's needs and aims to improve total cost of ownership. More recently, the platform has also undergone a number of developments to adopt the ISO 15022 and 20022 industry standards, which support interoperability and enable positions to be managed using a universal model. Cottingham explains that straight-through processing is woven into the functionality of the platform where appropriate, although clients have the option to govern parts of their operations by creating alerts or control points in the process. The platform is built on multiple databases and can be deployed within a firm's IT stack, or hosted on SmartStream's private cloud.

As the market continues to develop, Cottingham says the provider's aim is to evolve the platform and customize its offering to cater for a wide-reaching client base. "This will allow us to have a broader set of clients and a broader set of requirements coming through," he adds.

—JG

Nick Smith and Kurt Eldridge

One of the biggest steps undertaken by SmartStream in the development of the platform was the introduction of a model client configuration, an implementation model that can be tailored to each client's needs and aims to improve total cost of ownership.

Improvements Pay Off for SmartStream

SmartStream Technologies won the best corporate actions solution provider category in this year's Waters Rankings, thanks to its TLM Corporate Actions platform. Victor Anderson chats to Adam Cottingham, product manager of TLM Corporate Actions, about recent improvements to the offering, how SmartStream differentiates itself in a competitive marketplace, and the areas where capital markets firms are struggling when it comes to managing their corporate actions efficiently and accurately.

Q What tweaks has SmartStream introduced to TLM Corporate Actions over the course of the last 12 months?

Adam Cottingham, product manager of TLM Corporate Actions: TLM Corporate Actions is realizing an accelerated development roadmap after the investments SmartStream has made in expanding the team. The solution already supports the processing of all ISO events through their complete lifecycle, but we are always looking to improve our offering and provide value to our users and the market. Over the last 12 months this has been expanded to include processing of ISO 20022 messages and support for their interoperability with ISO 15022 messages. Proxy voting capabilities have been added to the solution, allowing meeting events to be processed and elected upon within the same platform. Within this year's release we have also expanded the multi-currency and fees-calculation capabilities within the solution.

Q The corporate actions processing market is a relatively mature and highly competitive one. What does SmartStream bring to the table that it believes sets it apart from other market participants?

Cottingham: When TLM Corporate Actions on-boards a new client, the main differentiator our customers cite is the quality of our engagement model. This is more than just the rich functionality set within the product. This comprises a model client configuration and the standardized integration model that has been developed by our business consulting team, who all have multiple years' operational experience within the corporate actions domain. This delivers industry best practice "out-of-the-box" in a solution whose underlying technology is flexible enough to also accommodate each client's proprietary processes. This approach drives down the effort and cost of delivery for a complete corporate actions processing capability to three to nine months, depending on the size of the operation adopting the solution. Now that our track record testifies to this capability, more clients are adopting this approach which further strengthens the model.

Q What areas of corporate actions processing are buy-side and sell-side firms struggling with at present, and how does SmartStream address those challenges?

Cottingham: Corporate actions processing challenges are common in the marketplace. Everyone caries event risk for operational failings and this is a key component for investing in improving legacy processes. I would summarize the key challenges in the following two categories:


Adam Cottingham

Market Challenges:

- Increasing volumes of events, event types, and managing their seasonality
- Attributing regional processing differences
- Keeping pace with changing regulations that require more data and cost-basis information to meet their reporting requirements
- Managing tax and currency calculations associated with cross-border holdings
- Accommodating inconsistent industry standards from the Securities Market Practice Group within Swift with the associated ISO 15022 and 20022 definitions

Processing Challenges:

- Reconciling multiple sources of upstream information that are often untimely, incomplete, and are subject to change
- Managing the communication flow across participants
- Keeping pace with both internal and external deadlines
- Accurately calculating cash and security entitlements and their tax implications and managing adjustments when information changes
- Apportioning different trading requirements for securities lending, collateral and finance trades across a traded and settled balance

What I would like to highlight is that traditionally undertaking a corporate actions project has been resource-intensive and expensive. SmartStream is looking to make that experience redundant with our fair value-based approach and accelerated delivery model. This should mean that clients can realize their goals of automation and control of corporate actions processing in the immediate future with minimal expense.

Q What's in the pipeline for TLM Corporate Actions for the next 12 months? Any new functionality on the horizon?

Cottingham: TLM Corporate Actions' main focus will now be on delivering a new UI for the solution. The user experience will be modernized with HTML5 screens for the main UI and portal. This will leverage the TLM View capabilities of the platform, which have already been rolled out across the Reconciliations product.

We will also be focused on managing the continuous improvement cycle for a model client configuration, whether they are industry changes applied to ISO standards and regulations or best practices defined by our clients in their given markets. W

Best Low-latency Data Feed Provider

Thomson Reuters

Since Thomson Reuters won this category in last year's Rankings, the data and technology giant has remained busy updating its Elektron data platform with the latest regulatory and technological developments. Its consolidated real-time feed provides low-latency access to clients globally, with coverage of over 500 exchanges and points of presence in cities like New York, Tokyo and Moscow. Needless to say, the platform has, over the years, become a crucial part of the financial services sector's backbone.

According to Marion Leslie, managing director of enterprise proposition at Thomson Reuters, one of the challenges in this space is to ensure that the content the firm offers the market reflects industry trends and the way customers want to consume their data. She notes that changes in market structure have driven the need for an evolution of one of Thomson Reuters' flagship offerings. "A great example of that would be the advent of Mifid II, which we believe created more than three trillion data points," she says. "The investment that we put into the platform ensures that all of those data points are carried over the network at low latency and that all the new venues are also carried over our platform."

A recent survey by Thomson Reuters found that some 90 percent of capital markets firms will use cloud for the majority of their market data needs in less than four years. For some, the benefits offered by cloud are scalability and variable computing power, allowing them to experiment with data in a way that doesn't require a lot of on-premises investment. In response to growing demand in the area, this summer the company's real-time data was made accessible via the cloud, providing clients with increased flexibility in terms of how they use and access their data. "It can be on-premises, it can be in a managed service, but it can also now be in the cloud," Leslie explains. "And we have been on-boarding all the Approved Publication Arrangement venues as a result of Mifid II—they are available over our network," she says.

Thomson Reuters has also been on-boarding crypto exchanges. According to Leslie, it is important to make available via its feed content the market is still experimenting with so that the service reflects current market trends. "We recently on-boarded five Japanese crypto-exchanges and earlier in the year launched a real-time feed for cryptocurrencies. So overall, we now have over 70 million instruments on our network, and they update at the rate of seven million instruments per second," she says.

—HA

"Since Thomson Reuters won this category in last year's Rankings, the data and technology giant has remained busy updating its Elektron data platform with the latest regulatory and technological developments.

Best Data Analytics Provider

S&P Global Market Intelligence

As firms look toward investing in more high-yield investments and private companies, additional data is required in order to quantify the risks associated with such moves. This includes searching for new and innovative methods of assessment, such as market sentiment and alternative data. Sometimes data can be hard to come by, especially since private companies don't publish their financial data.

S&P Global Market Intelligence with its Capital IQ Platform is no stranger to success in this category, having clinched this title back in 2014. Sid Dawuda, EMEA product lead and part of the risk services team at S&P Global Market Intelligence, says since last winning this award, S&P has included an expanded probability of default (PD) framework on the platform. This allows users to see a PD or letter-grade score even when there are no financials available for a particular company, which is an issue often encountered by those analyzing particularly small and medium enterprises (SMEs).

Dawuda says that at the same time, exposure to large, well-established companies is still a challenge for S&P clients. He says the collapse of large companies, such as UK government contractor firm Carillion, highlights the need for robust measures to quantify their supply chains and counterparty credit risks—which S&P's credit analytics suite assists with—forward-looking scores or PDs and benchmarks, putting the company performance into perspective against the country and industry peers.

S&P is investing heavily in AI by way of a number of recent acquisitions, including Kensho Technologies, a provider of next-generation analytics, AI, machine learning and data visualizations systems, and Panjiva Inc., a provider of global supply chain data. "We have been looking at leveraging AI to improve our data acquisition processes as well as develop new analytics leveraging alternative datasets," Dawuda says.

S&P is constantly looking to grow the coverage and features of its models in order to expand the use-cases its serves by assessing and monitoring counterparty credit risk. He says some projects involve coverage for local and regional government and qualitative factors.

Among other functionality, S&P also built International Financial Reporting Standard 9 and Current Expected Credit Loss-specific features and calculations into the platform, for clients needing to comply with reporting standards for their financial assets and stress-tests. It is currently in the middle of its latest phase of platform enhancements to improve on its average request response time. "We continue to explore ways to provide this additional insight with the use of cutting-edge technologies such as those pioneered by Kensho, while maintaining the transparency for which we are renown," says Dawuda.

—WSW

"We are once again pleased to be recognized by our clients and industry practitioners for our Xpressfeed and S&P Capital IQ platform. Our employees around the world work tirelessly to deliver world-class content, analytics and robust delivery options for our clients. Awards like these reinforce that these efforts and our investments in talent, data quality, and delivery are being recognized by our clients and the industry at large." **Warren Breakstone, managing director and chief product officer of data management solutions, S&P Global Market Intelligence**

Best Distributed-Ledger Technology Provider

AlphaPoint

AlphaPoint wins this year's best distributed-ledger network provider category in the Waters Rankings, thanks to its AlphaPoint Distributed Ledger Platform (ADLP). The New York-based firm has been busy enhancing ADLP over the past year along with its asset digitization products to expand its reach to a wider capital markets audience.

This year, AlphaPoint released its Regulated Asset Backed Token (RABT) offering, a means of digitizing real assets and allowing them to be traded on exchanges. Salil Donde, AlphaPoint's CEO, says the company offers a unique proposition to the market, especially as it considers itself a veteran in the blockchain space. "Once we refined our strategy, our customer acquisition accelerated," he says. "They understood [that] we offered a great product and are thought-leaders in the space. To really understand what is unique about us, you have to go back to 2013 when were founded—we are stalwarts in the blockchain industry and our longevity has allowed us to finely craft our technology."

Donde adds that AlphaPoint hires individuals from the capital markets in order to fully understand what is important to its clients and what applications need to offer them in order to gain traction and be successful in what is fast becoming a highly competitive market.

AlphaPoint designed its distributed-ledger technology to tackle two of the most pressing issues currently around blockchain: speed and privacy. Donde says ALDP uses a network of trusted nodes and encryption that allows for "rapid execution and a consensus mechanism." This has allowed customers to transact billions of dollars in trades using the firm's technology, he says.

But as the company continues to develop its platform, Donde says distributed-ledger technology will see greater adoption in a few years. "The world has changed: 2017 was the year of proofs of concept, and I believe 2018 will be the year that more commercial offerings come out," he says. "And 2019 could be the year of mass adoption, while 2020 is when we will see it become mainstream."

The past year has yielded more customers for the company, which has allowed it to further refine its offerings, including its products that digitize real assets for trading. RABT was one of the biggest launches for AlphaPoint this year. Donde says the motivation to push forward with RABT is that the company assumes that most assets will ultimately be digitized, even those that are heavily regulated.

—ED

Michael Haley, Brian Nadzan, and Nirbhay Kumar

> AlphaPoint designed its distributed-ledger technology to tackle two of the most pressing issues currently around blockchain: speed and privacy.

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Best AML Compliance Solution Provider

NICE Actimize

This is the fifth consecutive year that Hoboken, NJ-based NICE Actimize has won the best anti-money laundering (AML) compliance solution provider category in the annual Waters Rankings, no mean feat in a sector where providers need to stay ahead of the curve in order to survive. "You can either cast your net too long, or too short," says Stephen Taylor, general manager for AML at NICE Actimize. "If you cast it too short, there is a risk of missing something, but if you cast it too long there is a definite risk of getting too many false-positives," he says. "If you consider that most banks have a 95 percent false-positive rate, so 95 percent of what they catch is not true, that is the biggest challenge, because they still have to go through the investigation process." Taylor says that with all the new technologies and fintechs in the market, it is becoming easier than ever for money launderers to thrive.

As part of its AML offering, the company has been working with artificial intelligence, machine learning and robotic-process automation technology. Applying machine learning across millions of transactions that occur every day, helps predict where there might be sensitive or suspicious activity. Taylor compares the growth in such technologies to changes in the automotive sector where a decade ago it was gear sticks and clutches, while today the trend is leaning toward augmented intelligent driving with cars that park and stop themselves.

NICE Actimize's AML suite comprises suspicious activity monitoring, customer due diligence, watch-list filtering, Foreign Account Tax Compliance Act software, AML for money service business, currency transaction reports, and filing automation. According to Taylor, AI and machine learning are still in their nascence across the financial services industry, even though large numbers of user-firms and technology vendors have been dabbling with the technology for some time. "I liken it to the Commodore 64 or the Spectrum 48 back in the eighties with regard to computers," he says. "I can remember the Spectrum 48 and playing Space Invaders on it and thinking that it was out of Star Trek. We look back on that and remember that it only had 48k of memory. Your normal everyday watch has more memory than that. We are in the Commodore 64 point in time right now and I believe that we are just beginning to understand what is possible. Give this a few years and machine learning will be going in directions that we can only imagine right now."

—HA


Richard Tsai

This is the fifth consecutive year that Hoboken, New York-based NICE Actimize has won the best AML compliance solution provider category in the annual Waters Rankings, no mean feat in a sector where providers need to stay ahead of the curve in order to survive.

NICE ACTIMIZE

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More Intelligence, Less Work.

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Best Market Risk Solution Provider

Numerix

Technology holds the key for capital markets firms to be more efficient and agile in their workflows. But there are many things to consider before adopting new technologies. One such challenge relates to the decay of legacy infrastructure embedded within firms, according to Steve O'Hanlon, CEO of Numerix. The New York-based provider of risk management technology and services, and the winner of the market risk category in this year's Rankings, provides a solution to its clients, Numerix Oneview, which supplies next-generation risk and profit and loss (P&L) systems to the trading business. The system is able to handle complex products, high-volume instruments and a variety of execution styles.

To address the challenge of adopting technology amid firms' legacy infrastructure, Hanlon says in the past year, the company has focused on the development of reactive microservices or dependency-graph capabilities for faster, event-driven calculations. In May this year, Numerix deployed Oneview on OpenFin's desktop operating system. At the time, it was running a beta program of the offering with select clients. Hanlon says Numerix's user interface innovation continues to progress. "Our goal remains to deploy our Oneview front-to-risk platform on the OpenFin desktop operating system and we expect it to be available to all our clients later this year," he says.

With app containerization provided by OpenFin, which allows for industry-wide desktop app interoperability, Oneview's capabilities such as trade entry, trade blotter, risk, pre-deal checks and market data, are discrete apps that can be independently moved, resized, docked or pinned, or snapped together, Hanlon explains. "This provides users with a fully customizable workspace so that their desktop real estate is optimized, enabling them to see all the information they need and interact more efficiently with the apps they use frequently," he says.

A major development for Numerix in 2017 was enabling its cloud services through a new managed services component, which clients across the globe were asking for. Hanlon explains that market participants are finding managed services as a better way to achieve their objectives compared with on-premises systems. "Because of our agility, we were able to quickly capitalize on this growing trend in 2017 by building and deploying multiple technology solutions through a new managed services platform, which offers a range of diverse applications to support valuation, risk, and infrastructure requirements," says Hanlon.

In the coming months, Numerix will focus on achieving complete coverage for the Standard Initial Margin Model.

—WSW

Steven O'Hanlon and Emily Jean-Pierre

"With app containerization provided by OpenFin, which allows for industry-wide desktop app interoperability, Oneview's capabilities such as trade entry, trade blotter, risk, pre-deal checks and market data, are discrete apps that can be independently moved, resized, docked or pinned, or snapped together.

numerix

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To learn more about Numerix Oneview visit www.numerix.com

Best Credit Risk Solution Provider

Moody's Analytics

Accurately measuring a firm's credit risk and probability of default is hugely important in an industry that constantly evolves. Perfecting this capability has been a core objective for Moody's Analytics, and thanks to the significant development of its RiskCalc offering in recent years, the provider has returned to the winners' circle at the Waters Rankings, taking home the best credit risk solution for the third consecutive year.

The RiskCalc platform is designed to enable both buy-side and sell-side firms to evaluate their default and recovery rates using specialized models that generate credit risk calculations and analysis, including expected frequency of default, loss-given default, expected losses and credit measures of global firms. The platform's models provide analysis based on systemic credit measures, financial statement data and equity market information, compiled within Data Alliance, a global database containing private credit risk data.

Since its launch in 2000, client needs have been a key driver in the evolution of the RiskCalc platform and its methodologies. Ed Young, senior director at Moody's Analytics, explains that the firm is continuing to develop and diversify RiskCalc's range of 30 industry and region-specific models, to apply to multiple global use-cases, including banks, asset managers and corporate entities. He says that the core value of harnessing credit risk information is to better inform important investments or business decisions. "Understanding the credit risk parameters around investments firms are making is the cornerstone of what we are doing with RiskCalc," he adds. "This quantitative estimate of creditworthiness can be applied to many different tasks in an organization, from financial planning to stress-testing and accounting losses," Young says.

RiskCalc has undergone multiple developments over the last 12 months, enhancing its functionality, delivery, and design. In June this year, Moody's Analytics launched RiskCalc Small Business solution, a model feature that sits within the RiskCalc suite that evaluates and scores the creditworthiness of small businesses by incorporating trade and behavioral data into its modeling framework. Additionally, the provider released multiple new private firm models for EU regions such as Norway, Finland, Sweden, Denmark, Portugal and Spain.

Irina Baron, director of customer success at Moody's Analytics, explains that the website has also undergone a complete redesign in an effort to improve user-friendliness and integrate RiskCalc into internal workflows. Looking forward, she says, the firm will continue to develop the platform and focus on client needs, while also evolving model frameworks, exploring portfolio analytics and "leveraging the latest technologies" such as artificial intelligence, to help build new models and enhance existing ones.

—JG

Uliana Makarov and Irina Baron

> The RiskCalc platform is designed to enable both buy-side and sell-side firms to evaluate their default and recovery rates using specialized models that generate credit risk calculations and analysis, including expected frequency of default, loss-given default, expected losses and credit measures of global firms.

RiskCalc™ voted Best Credit Risk Solution Provider for the third year

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Use our award-winning solution to improve management of risk ratings, stress testing, credit loss allowance, portfolio management, risk reporting, regulatory compliance, and more.

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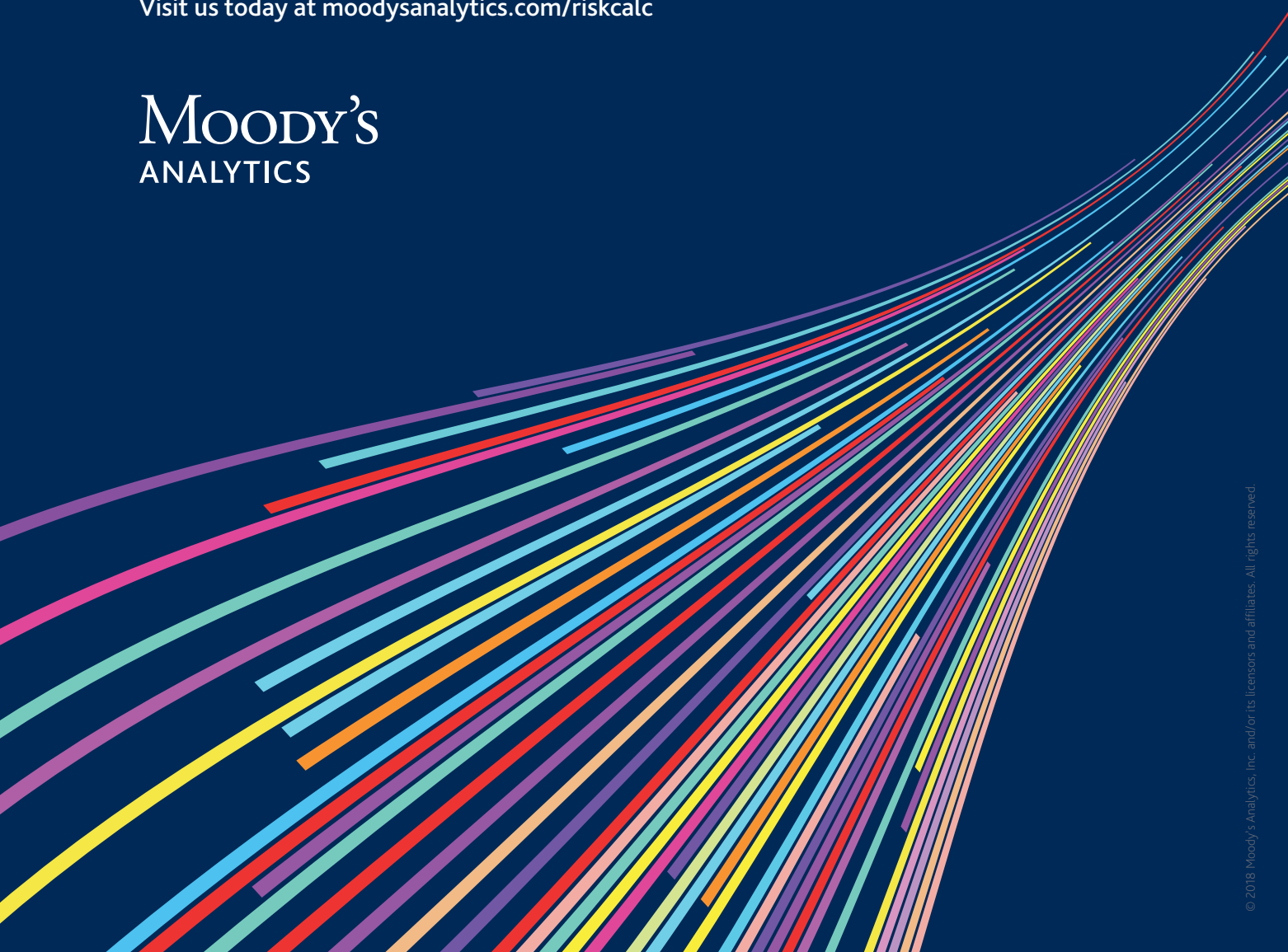

Best Market Surveillance Provider

Nasdaq

Since 2012, when this category was introduced to the Waters Rankings, it has only had one winner—Nasdaq, with its market-leading Smarts surveillance platform. In use at 50 exchanges and marketplaces, 17 regulators and over 150 market participants, Smarts is easily one of the more dominant and technologically advanced software packages in the market at present, and it's continued to expand this year.

Much of the focus, for Smarts, has been around behavior in varying facets. Some of this is due to the acquisition of Sybenetix, the buy-side behavioral science specialist, announced in July 2017, but it's also been home grown. In 2017, for example, Nasdaq released its Lens product for Smarts, a tool that allows surveillance officers to identify trader "fingerprints," and thus pick up abnormal behavior in a way that wasn't necessarily possible before. For instance, while surveillance officers generally rely on traditional indicators to pick up layering, spoofing and other forms of market abuse, they may not focus on other metrics, such as a pronounced and sustained peak in profitability that is out of proportion to a peer group. "Individuals can beat the market and be really good at trading, but not always and not all the time in comparison to their peers and others with the same strategies and styles," says Valerie Bannert-Thurner, global head of the risk and surveillance solutions business at Nasdaq. "Lens has had really rapid adoption by our customers, and it's been an interesting development because our customers had to change their surveillance processes. Before, analysts were just going through the alerts, and now we're giving them a different view."

Firms are already generating suspicious activity reports (SARs) off the back of Lens, Bannert-Thurner says, which has been "a really nice validation" of the approach used.

In addition, Nasdaq has continued its exploration of machine learning, rolling out a tool on its Nordic exchanges, which it later productized through Smarts, designed to rank analyst alerts and prioritize them using a range of information, and score those likely to turn into SARs. The first customer for the technology was Hong Kong Exchanges and Clearing.

"Our customers are still people," Bannert-Thurner says. "We still service humans – we're not a machine-to-machine engine. So you really have to think about what data you bring to the forefront and how a human will look at it."

Looking ahead, she sees a period of change coming for Smarts. While it has traditionally been a pure-play surveillance platform, she says, developments are pushing it more into the role of a general compliance platform. That will, no doubt, be welcomed by its many users.

—JR

Chris Richards

Since 2012, when this category was introduced to the Waters Rankings, it has only had one winner—Nasdaq, with its market-leading Smarts surveillance platform.

Best Reporting System Provider

FactSet Research Systems

FactSet is back in the Rankings winners' circle for the third straight year in one of the most competitive categories of the 30 on offer, thanks to a combination of its FactSet Publisher and Vermilion offerings. The Norwalk, Conn.-headquartered firm acquired Vermilion and its Vermilion Reporting Suite in November 2016, and since then has extended the platform's impressive client roster across its traditional strongholds of the UK and Europe, but increasingly across North America and Asia-Pacific too.

Over the past three years, FactSet has made clear its intention of evolving into far more than just a specialist data provider, with the acquisitions of BISAM in March 2017, Portware, a provider of buy-side-focused multi-asset execution management systems in October 2015, and Cymba Technologies in September 2016, with BISAM dovetailing neatly with Vermilion even though it possesses its own client reporting functionality alongside its bread-and-butter performance and attribution, and risk functions.

"The acquisition of Vermilion was to support a growing strategy within FactSet to be able to essentially link together any data source within the organization along with the reporting exercise [functionality]," says Ben McCormack, associate director, analytics reporting and APIs at FactSet. "Publisher had a strong business prior to the acquisition, but its main focus is taking FactSet analytics data and producing internal reports for the board and portfolio managers. So when we run Publisher reports, we are going straight to the analytics engine to have that data calculated in real time, although that isn't the best approach from a client-reporting perspective—client reporting needs stable, locked down, 'non-indicative' data."

McCormack explains that FactSet's acquisition of Vermilion puts it in a position where it can service buy-side firms' specific reporting needs. "The strategy we've got here is how we link together performance and attribution characteristics in the context of internal and external client-facing reporting," he says. "It's been a good two years for us—it's very complimentary to the FactSet offering."

According to McCormack, the firm is focusing on developing tighter integration between its traditional portfolio analysis strengths and Vermilion and BISAM, allowing clients the flexibility to opt for the specific performance and client reporting functionality they require, rather than forcing them to retain an application or implement a new one based on their existing technology stacks and contracts. Essentially, FactSet aims to provide clients with greater flexibility and choice. "The goal is to have a turnkey situation where if a client owns BISAM, we can plug in the appropriate reporting solution for the challenges they're facing," he says. "And it doesn't necessarily require the ground-up plumbing that would normally occur if Vermilion was acquired as part of a separate process."

—VBA

"The firm is focusing on developing tighter integration between its traditional portfolio analysis strengths and Vermilion and BISAM, allowing clients the flexibility to opt for the specific performance and client reporting functionality they require, rather than forcing them to retain an application or implement a new one based on their existing technology stacks and contracts.

Best Accounting System Provider

SS&C Advent

When it comes to products, SS&C Technologies has an embarrassment of riches. Two such offerings it acquired as part of its July 2015 Advent Software acquisition are Geneva and Advent Portfolio Exchange (APX), which in tandem landed the firm the best accounting system provider category in this year's Rankings. Of the two, Geneva is more widely known, although according to Robert Roley, senior vice president & managing director, general manager of SS&C Advent, APX has a larger client base and generates more revenues. "We refer to Geneva as a best-of-breed solution and APX and all the solutions that go around it as best-of-breadth," Roley explains. "Geneva focuses on portfolio accounting, catering to different types of managers, excelling at the extremes of the spectrum from a complexity and scale perspective. Because of that, it has been successful in the hedge fund market, but also with global asset managers that invest in all kinds of structures and complex products. The majority of APX's clients tend to be asset managers that cater to both individuals and institutional managers, but as part of a suite, it offers the breadth that Geneva doesn't have."

APX features client reporting, performance and attribution, composite management and client relationship management functionality, and offers turnkey integration with the firm's trading, billing and revenue management applications and data.

SS&C Advent continues to invest significantly in the technology underpinning both products—it has been around for a number of years and so have Geneva and APX, so it has to "re-invent" from a technology perspective to keep up with user-experience expectations, but also to fully embrace the evolution in technology. "We want to be able to take advantage of new tools as they become available," Roley says.

On the APX front, a lot of the recent focus has been around regulatory support. The platform is widely used, not only in the US but in Europe, Asia and the Middle East, spurring the firm to add Mifid II and GDPR support. "And although there seems to be a move in the US away from regulation, even US managers catering to non-US investors are subject to things like GDPR," Roley explains.

On the Geneva front, recent enhancements include support for swaps and bank loans, while the firm has also identified a recent uptick in private lending. "A lot of our hedge fund and business development company clients are doing private lending, and so there are unique workflows and calculations that we have added to the platform," Roley says. "We've also added support for cryptocurrencies and enhanced our support around fee calculations."

—VBA

Chris Somers, Katherine Pearce, and Neil Sullivan

> APX features client reporting, performance and attribution, composite management and CRM functionality, and offers turnkey integration with the firm's trading, billing and revenue management applications and data.

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It all adds up...

Voted **Best Accounting System Provider** for the 4th year in a row.

waters rankings 2018

Best Accounting System Provider

Winner

SS&C Advent - Geneva and Advent Portfolio Exchange (APX)

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Best Cybersecurity Provider

Eze Castle Integration

Cybersecurity has become one of the most significant technology risks directly affecting all organizations with a digital presence and their end-consumers. Capital markets firms are no different—they need to constantly keep themselves well-protected from cyber threats, not only for the long-term health and sustainability of the organization, but for their clients too. Meanwhile, cybersecurity solutions providers need to stay abreast with the latest threats and ensure that they are able to offer solutions that continue to adequately safeguard their clients as cyber-threats become ever more sophisticated and pervasive.

Eze Castle Integration (ECI), which wins the best cybersecurity provider category in the Waters Rankings for the third year in succession, has for more than two decades been focused on providing the technology solutions and services required by the investment management industry to operate successfully. ECI, with its Eze Cybersecurity platform, has made it its mission to stay ahead of the industry's threats in order to protect its clients. The services it provides include vulnerability assessments, active threat protection, simulated phishing and training, and written information security plans.

It is important to adapt to the changing cyber-threat landscape, and this is exactly what Eze Castle does with its cybersecurity protections. "Take our Eze Cloud solutions as an example—we continue to add new layers of security within the offering from advanced threat detection and prevention to next-generation firewalls," says Mary Beth Hamilton, vice president, marketing at Eze Castle Integration. "At the same time, we educate our IT experts on the evolving threat landscape so that they are prepared to proactively protect client environments."

In terms of its private cloud solution, Eze Castle has deployed a robust and scalable private cloud infrastructure that delivers a full spectrum of cloud security practices to protect sensitive client data and resources, including 24/7 intrusion prevention and detection-monitoring by security analysts. The security measures include physical security, isolation and virtualization security, policy enforcement and access control, encryption, and resiliency.

The firm's Eze Managed Suite combines a robust and highly secure private infrastructure via the Eze Private Cloud with key business applications and professional IT management. Through the Eze Managed Suite, users are able to experience secure access to data anywhere, and at any time, with 24/7/365 security and built-in disaster recovery. Hamilton says that over the course of the next year, ECI will continue to build on its cybersecurity offerings based on what its clients require.

—WSW

Bob Shaw and Tim Kennedy

"Eze Castle has deployed a robust and scalable private cloud infrastructure that delivers a full spectrum of cloud security practices to protect sensitive client data and resources, including 24/7 intrusion prevention and detection-monitoring by security analysts.

Best Outsourcing Provider

Electra Information Systems

For the second year in a row, Electra Information Systems wins the best outsourcing provider category at the Waters Rankings. Electra's CEO, John Landry, says the company strives to offer a level of service to clients that can manage the time-consuming, resource-intensive functions associated with large and often complex outsourcing arrangements. "Electra solutions deliver scalability and flexibility and we look forward to another successful year of providing award-winning offerings to the industry and our clients," says Landry. "This is especially true in outsourcing where you have to provide levels of service greater than previously provided, whether by another vendor or an in-house team."

In a bid to continue improving its outsourcing offering, Electra has expanded the types of data it provides clients in addition to its various service activities. These new data types—which were added to the Electra Data, Electra Data+ and Electra Reconciliation suite of products—includes income and expense data, statement of assets and liabilities, margin data, portfolio models, compliance data, and currency exposures.

Landry says Electra decided to include managed reconciliation services in addition to its data acquisition offerings to its outsourcing business because its clients were looking to offload more functions to outsourcing specialists. "The inclusion of this new data relieves our clients from a wide variety of manual research and retrieval tasks, simplifies break investigation and resolution, and streamlines their exception-management processes," Landry explains. "Electra Managed Reconciliation Services brings Electra's data and software expertise together with expert staffing in a consolidated outsourced service offering. It extends the client's own operations team," he says.

Electra has also added an outsourced settlement service that allows clients to outsource affirmation/confirmation processing, settlement notification, and third-party reporting. This went into production in early 2017 and has since had several clients sign up, according to Electra.

The New York-based firm continues to look toward the future since many financial services firms are looking to outsource a broader range of functions. Landry notes that the company is looking for opportunities to provide additional services, and that the kind of activities being outsourced are more rote than knowledge-based ones, especially with firms wanting to reduce their operating complexity and costs. He says firms recognize that despite the great return on investment derived through implementing and maintaining reconciliation systems, in-house staffing numbers tend to be too low to make that a feasible option. Instead, he says, capital markets firms prefer to outsource onerous, routine-based activities like reconciliations to providers like Electra and keep more knowledge-based tasks like analytics in-house.

—ED

Om Chunhanon, Ian Danic, and Vee Woo

> Electra decided to include managed reconciliation services in addition to its data acquisition offerings to its outsourcing business because its clients were looking to offload more functions to outsourcing specialists.

Best Trading Floor Communication System Provider

IPC Systems

In order to fully appreciate the iron grip IPC currently has on the best trading floor communication system provider category in the Waters Rankings, consider this: The Jersey City-based firm has won this category for the past 13 years, and is, therefore, hands down the most successful technology vendor in the history of these awards. What's more, while the trading communication system market is hardly awash with vendors in terms of sheer numbers, it is nonetheless highly mature and competitive, which underscores IPC's impressive track record, thanks to its flagship offering, Unigy.

According to Don Henderson, senior vice president of product and customer success at IPC, Unigy was designed specifically for regulated users—it's a workflow architecture and voice communication platform that has been customized for the trading environment. "The workflows [within Unigy] are our differentiators, allowing the front and middle offices to communicate back and forth," Henderson explains. "The other thing that makes Unigy stand out is its robustness—we've spent a lot of money on scalability and we think it is unique in the industry because it scales further than any other product. It's designed as a fully fault-tolerant, robust architecture incorporating all the classic BCP-failover capabilities, and of course it's targeted as a collaboration tool allowing users to communicate with all their counterparties."

IPC releases two major upgrades each year to the platform, which has resulted in two noteworthy enhancements over the last 12 months—one, on the security front, and the other to support external application interoperability. "We have spent a significant amount on continuing to ensure that it's a highly secure platform," Henderson explains. "The second [enhancement] is our BlueWave interface that enables users to access data within the system so that they can integrate it within the applications they are using, for example CRM tools."

And as for future enhancements that IPC has penciled in, it'll come as no surprise to many that they entail two perennial challenges common to most capital markets firms: data and interoperability. "We're continuing to work on providing users with access to voice information—we call that 'voice-to-data'—and our goal is to enable more methods for our end-users to take voice and integrate it into their systems, whether that be pure voice or voice converted as data," Henderson confirms, adding that last year's tweaks entailed rolling out a new touch screen and extending application integration. "We can't treat voice as a standalone product anymore—it really needs to be fully integrated into end-user applications," he says.

—VBA

Laurence Pinkus and Neil Fishler

> The Jersey City-based firm has won this category for the past 13 years, and is, therefore, hands down the most successful technology vendor in the history of these awards.

Best Network Provider

BT

BT once again takes the crown as the best network provider at the 2018 Waters Rankings for its Radianz Cloud offering, extending its impressive track record in what has become one of the most closely contested of all 30 categories on offer. The London-headquartered company won the same category last year.

By winning this category back-to-back, Radianz's head of business development, Yousaf Hafeez, says clients have demanded more services, including applications and connections to datacenters. "Customers want to have access to services in a low-cost way and they want to spend time to build that proposition on the cloud," Hafeez says.

As an example, Hafeez points to the Radianz Connect offering, providing a point-to-point service between datacenters. Clients demanded this service in order to reduce trading times, he says. As part of its growth strategy in the past year, BT has steadily been growing its stable of applications available on the Radianz network, which currently stands at around 3,300, although Hafeez adds that more are primed to go live. The firm is looking at four different types of application to launch via Radianz: access to more trading venues for different asset classes including crypto assets; making more alternative data available; adding additional risk and compliance applications to meet regulatory requirements on the back of the revised Markets in Financial Instruments Directive, the Fundamental Review of the Trading Book and know-your-customer regulations; and applications using artificial intelligence and machine learning to help firms with performance and compliance issues.

These applications, according to Hafeez, help clients to access services without having to install software. He adds that one of the trends BT has identified from clients is seeking connections to public cloud networks. "One of the trends we're seeing is customers are looking at cloud and what we've done is develop a portfolio of services to meet their requirements," he says. "So if they want to go to a public cloud, we can provide them with that connectivity. Some of our clients want a hybrid cloud as a better solution and we can also help them build their own private cloud service."

A big push for BT in the coming year is expanding its global footprint, especially as its customers are increasingly focusing on emerging markets like Asia. Hafeez says the industry has been ramping up its investment in infrastructure and resources in the region, which means BT also has to meet that need. Clients in the US and Europe also want to access applications that may reside in Asia, he says.

—ED

Kevin McLynn, Walter Terbrusch, and Sergio Angeloni

BT once again takes the crown as the best network provider at the 2018 Waters Rankings for its Radianz Cloud offering, extending its impressive track record in what has become one of the most closely contested of all 30 categories on offer.

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Thousands of member sites make up the worldwide BT Radianz Cloud community

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Best Cloud-Based Services Provider

Eagle Investment Systems

Eagle Investment Systems wins this year's best cloud-based services provider category in the Waters Rankings, thanks to its Eagle Access platform, supplanting last year's winner, Archer.

Mal Cullen, CEO of Wellesley, Mass.-based Eagle, says the company has seen the industry become more comfortable with cloud, spurring it introduce more offerings and services. "I think that as we matured over the years, we started to introduce new solutions," Cullen says. "The industry has matured as well in that they're more confident in the cloud where they have projects and they're asking what workloads can be put on it, so we work with them on that. We actually take on the responsibility for things that clients don't see as a competitive differentiator or core competency for their business," he adds.

To that end, Eagle has focused on its managed offerings, which Cullen says has become a big trend, as clients don't want to run non-core tasks anymore. Eagle Access hosts solutions ranging from portfolio management to data management and investment accounting in its secure private cloud.

One of the biggest projects Eagle undertook this past year is its public cloud joint venture. The firm announced a partnership with Microsoft Azure in April to provide access to a public cloud network to companies seeking development in that space. The firm will move some of its applications and services from its private cloud to Azure to provide customers with both options. "We'll continue to have the Eagle Access business, which is our private cloud, but we will also be able to introduce public cloud capabilities for our clients, even though not everything will be going to the public cloud," Cullen explains. The company says this is because many customers are not ready to fully embrace the public cloud, so it was important to offer a hybrid service among a variety of deployment options.

The fact that datacenters are no longer being built, Cullen says, brings cloud architecture to the forefront of people's infrastructure plans, as well. Cullen notes that while a large chunk of the industry understands that putting more infrastructure into the cloud is important, there are still concerns around security and data sensitivity that need to addressed, which is why Eagle allows clients to determine their comfort level with respect to the cloud and why optionality is key when building systems in the cloud.

An additional issue Cullen cites that will greatly impact private and public cloud adoption is "modern" regulation. "Security and sensitivity is still a concern, but regulations need to be modernized as well to keep up with new technologies and infrastructures," Cullen says.

—ED


Jeremy Skaling

One of the biggest projects Eagle undertook this past year is its public cloud joint venture. The firm announced a partnership with Microsoft Azure in April to provide access to a public cloud network to companies seeking development in that space.

CONTROL YOUR DATA, EVOLVE YOUR BUSINESS

As the pace of industry change increases, so does the need for a flexible operating model. With help from Eagle's portfolio management suite—powered by Eagle ACCESS℠, Eagle's secure private cloud—your business can remain agile and responsive to market, client and regulatory changes.

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Best Mobile Solution Provider

Thomson Reuters

Many organizations are looking to leverage the investments they have made in desktop applications in order to provide the best possible, tailored experiences on mobile devices for their clients. In this regard, web-based technologies are making it easier for technology providers to develop cross-platform, responsive mobile experiences.

Data provider Thomson Reuters, winner of the best mobile solution provider category in this year's Rankings, thanks to its Eikon Messenger platform, is continuing to invest in the App Studio in order to provide that accessibility to its customers and allow them to view and manage their investments in the Eikon open platform. "We also continue to improve the collaboration messaging experience on iPhone, iPad and Android, and streamline the workflows on mobile for many apps available via Eikon today, including the notification experience," says Lesli Fairchild, head of collaboration services at Thomson Reuters. "Customer are asking for more tailored and intelligent notifications, especially on their mobile devices and this is an area where we think our services can help."

Thomson Reuters has delivered numerous enhancements to Eikon Messenger to help satisfy the immediate and evolving needs of its customers. This includes the release of new compliance features, file-share controls, enhanced encryption, and reporting capabilities.

This is in line with its clients' top concerns—increased regulation along with data privacy and security. To this point, Fairchild says the vendor will continue to invest in order to enhance user workflows, including tighter integration with Thomson Reuters' trading assets. A number of these enhancements will be delivered over the next few quarters, she adds. "We will also deliver improvements to our content-sharing and compliance capabilities, to our mobile experience and through the release of our APIs, and deliver tools that will help power automation across our platform," she says.

According to Fairchild, Thomson Reuters is planning on releasing a new version of Eikon Messenger in the late third quarter of this year in response to customers who see collaboration platforms as the "glue that can bond" disparate legacy platforms and new technologies, and enable streamlined and automated workflows. She adds that the new version of Eikon Messenger will include side-by-side API integration capabilities, allowing for interoperability between Eikon Messenger and other applications running alongside it on the same desktop. This will be followed by the release of the Eikon Messenger Server Side API, an open API that will provide customers with a toolkit to enable productivity improvements and cost-savings and efficiencies across the board.

—WSW

"Thomson Reuters, has delivered numerous enhancements to Eikon Messenger to help satisfy the immediate and evolving needs of its customers. This includes the release of new compliance features, file-share controls, enhanced encryption, and reporting capabilities.

Best Cloud Infrastructure Provider

IPC Systems

IPC follows up its success in the best trading floor communication system provider category in this year's Rankings (page 89) by winning the best cloud infrastructure provider category, thanks to its cloud-based Unigy 360 platform. Some might question the appropriateness of Unigy 360 in this category, given that technically it is a cloud-based suite of applications and not an infrastructure, but such is the model underpinning these awards that it was *Waters*' readers who had the final say.

According to Don Henderson, senior vice president of product and customer success at IPC, Unigy 360, launched in 2017, was developed to support the firm's digital transformation strategy. "As the industry continues to move in that direction, we took Unigy and created an all-software version of it," he explains. "Our strategy was to deliver a voice platform with all the workflows, all the [user] requirements, and all the regulation issues as a fully integrated platform for our end-users. The primary difference between Unigy and Unigy 360 is that Unigy is just one of a number of components in the Unigy 360 architecture, although we still use the tried-and-tested Unigy software for the core communication part within Unigy 360."

Henderson describes the initial response to the new offering as "excellent," especially in the small-to-medium-size market and the buy side in particular. "We're now engaging our larger clients who already use Unigy, because now we are developing a connection between our cloud and on-premises offerings," he says.

Given the inexorable shift across the capital markets toward entirely cloud-based technology stacks, how likely is it that Unigy will ultimately be superseded by Unigy 360 and thus disappear altogether from desktops? And how might traders feel about being weaned off a hard turret with buttons and a device to manage their call flows in favor of a screen-only interface? "That's typically a user-experience that traders are not willing to give up," Henderson explains. "But what we do see is expanding the Unigy capabilities through the Unigy 360 platform that will allow them to experience some functions differently. For example, some of the functionality you see on the hard turret will be ported to a mobile device."

From a delivery and development perspective, cloud-based platforms offer advantages against which locally installed applications simply cannot compete, by virtue of their ability to continuously drip-feed new functionality to users in an Agile manner on a weekly or even daily basis. "That's exactly what we do [with Unigy 360]," Henderson says. "We have put in place a continuous-build architecture. It's designed as a complete micro-services platform so that we can upgrade [functionality] on a weekly basis, if necessary."

—VBA

Laurence Pinkus and Neil Fishler

IPC follows up its success in the best trading floor communication system provider category in this year's Rankings by winning the best cloud infrastructure provider category, thanks to its cloud-based Unigy 360 platform.

Anthony Malakian

To a Bright Future

In echo chambers, it's easy to believe that we're heading for a horrible ending as a species. Anthony argues that people need to take a deep breath and a step back.

To listen to some people talk about the future of technology, we're heading for a dystopian end. There will be scarce jobs for humans, which will lead to humans fighting over scarcer-still resources. It's tough to tell someone who has already lost their jobs to automation that this horrible future has not already been written in stone.

It is true: Machines are going to displace millions of people in the workforce for decades to come. And the sad thing is that politicians are unlikely to help much during this transition. It's far easier to say that illegal immigrants are stealing your jobs or that if we just raise the taxes on the richest one percent, we can provide assistance to those who have lost their jobs to machines and all problems will be solved. Answer the root cause of those lost jobs? Well, that's a tougher sell that won't win very many votes. And more worrisome is that our public school system is woefully unprepared—both from a talent perspective and from a resources perspective—to properly train the workforce of the future for the jobs of tomorrow.

While there's certainly reason for pessimism, I'm an optimist. Former US President Barack Obama loves to use a quote from Martin Luther King Jr: "The arc of the moral universe is long, but it bends toward justice." And after Donald Trump upset Hillary Clinton to win the presidency, Obama also noted that "the path this country has taken has never been a straight line. We zig and zag and sometimes we move in ways that some people think is forward and others think is moving back." But in the grand scheme of things, forward we go.

Sadly, the political discourse we've had over the last two or so years on cable news outlets, in our own living rooms and on social media has been worrisome, to put it nicely. Every conversation is an end-of-days conversation until the next day when the next end-of-days conversation rears its ugly head. But this willfully ignores the fact that we, as a human race, have never been better off. People, as a whole, live longer, can communicate more easily, have more access to information, can more easily move about, and are freer. This is not the case in every corner of the world, but as a whole, it is undeniable.

> "Technology will create new problems, to be sure, but these machines will also spawn new opportunities.

From the late 1950s into the late 1970s, just in the US, President John F. Kennedy was assassinated on the streets of Dallas and his brother, Bobby, was gunned down in a hotel in Los Angeles while running for president. In between those two horrific events, Martin Luther King was assassinated in Memphis. At the same time, thousands of US soldiers were coming home from Vietnam in body bags. The threat of a nuclear war with the Soviet Union was persistent for decades. President Richard Nixon got on a helicopter and resigned the office of the presidency. Black people did not have the rights they do today and lynchings were still very much a thing in the deep South. The glass ceiling was far lower back then for women than it is today and sexual harassment and discrimination were as ingrained in society as lemonade and apple pie. People in the LGBTQ community were forced to live in the shadows.

This is not to say that things are perfect today; it's just to say that we, as humans living in a free society, have always slowly fought for what is morally just. We don't tend to get there as quickly as some might hope, and there are always setbacks, but we, as humans, have always strived for … better.

Social media and cable news outlets have provided sounding boards for the worst of our society all while people are thinking less critically and falling into the trap of tribalism. But sometimes we need to take a deep breath and take one big step back.

Technology will create new problems, to be sure, but these machines will also spawn new opportunities. Jobs we've never considered will be created. Healthcare will be improved. Ways to clean the mess we've created of our environment will be rolled out. We'll be able to reach the stars in ways we thought were only possible in science fiction. It's easy to be a pessimist about the future. I like to think that our best days are still ahead of us, and technology will help us get there. W

Can technology help save us?
For more information and readers' feedback please join the discussion at **waterstechnology.com**

Fintech Finally Finds Its Feet

As *Waters* celebrates its 25th anniversary, James increasingly sees an industry more excited about technology than ever—and with good reason.

Fintech poised to take off?
For more information and readers' feedback please join the discussion at **waterstechnology.com**

As anyone who listens to the Waters Wavelength Podcast knows, I'm not a particularly good prophet of the future—particularly when it comes to World Cup results. That's why, when we sat down to discuss what would be in the 25th anniversary issue of *Waters*—this very issue, if you're reading the print copy—we decided to leave it to the experts.

Our forward-looking feature on page 21 has a host of senior figures from all areas of the industry telling us what they think will be the foundational technologies of the next 25 years. While the usual suspects are there, it doesn't take long before it's easy to see that there's a common thread. Taken together, the combination of artificial intelligence, cloud computing, distributed ledger and the internet of things, and the emergence of quantum computing suggests that we're on the verge of a change in market technology that hasn't been seen since the emergence of electronic trading.

Indeed, the change that is just around the corner may well be more significant than that. It's been easy to sniff at fintech over the past few years, particularly for those of us who were working in, covering, or just following fintech before it had the slightly cringeworthy label. The industry didn't help itself, often seeming at times to be a desperate attempt by men and women trying to capture a trend while being a bit too straight-laced to do so. You know, like blokes in their mid-40s with fresh full-sleeve tattoos and fauxhawks.

But leaving aside the bluster, the ping-pong tables and anyone with the job title "evangelist" who doesn't work directly for a religious organization, fintech has become the great connector of the markets. There is still a place for incumbent technology, and as we at *Waters* have long said, the bravado of disruption has long been quietly substituted for augmentation.

> It feels like the market is truly getting to grips with what it has in front of it now, from a technology perspective.

Now we see where the true power of fintech lies, however. Whether it's in plugging the traditional workflow gaps of enterprise software or providing the connectivity to build the next generation of operating systems—OpenFin's FDC3 initiative springs to mind—fintech is slowly becoming the glue of market technology, settling in to the gaps and spaces, and binding it together.

It's also giving market technology a flexibility that it hasn't had before. Projects like Symphony and its interoperability with third-party systems are evidence of this, as are startups like Finbourne, providing integration layers and infrastructural backbones without restricting a user to modules it designs.

All of this is necessary, as it becomes impossible to adequately future-proof. The pace of current innovation has rendered plans put in place even five years ago largely obsolete for many firms—which now have secure and reliable public cloud to depend upon rather than expensive private or hybrid infrastructures, new database technologies such as distributed ledgers and less of a focus on the investment books of record, the complex events processing engines and the grid computing setups of old (read: a few years ago). Now we're talking about creating computer systems that we can't quite describe properly, because our traditional metrics don't adequately capture what they could potentially do, or work environments that exist neither in the physical world, or the digital, but somewhere in between (*see page 38 for more*).

It's taken a while to come, but it feels like the market is truly getting to grips with what it has in front of it now, from a technology perspective. There's a certain level of maturity, yes, and a good deal less of the hot air that so defined the brash fintech upstarts of the early decade, of course. But there's also a palpable sense of excitement that stretches across technology more broadly, and not just confined to those with the luck or the foresight to be involved in the next big trend on the ground floor. This excitement, it seems, is based on the idea that we're truly entering the next age of technology—and it's just around the corner. Here's to the next 25 years. W

Human Capital

Augustsson Departs Cinnober, CFO Lenardos Named CEO

Stockholm-based Cinnober Financial Technology has appointed Peter Lenardos as group CEO, replacing Veronica Augustsson, who is leaving the company after six years as CEO.

Augustsson had spent almost her entire career at Cinnober, which she joined as a programmer in 2002, holding roles in technical sales and business development, and head of sales, before being named CEO in 2012 at the age of 33.

Lenardos has been Cinnober's CFO since June, and served as a senior financial advisor to the company since April. He will also serve as acting group CFO in addition to group CEO while the company searches for a replacement CFO.

Prior to joining Cinnober, Lenardos was a managing director and analyst in Royal Bank of Canada's (RBC's) London office,

Peter Lenardos

where he established the global market infrastructure and European diversified financials franchises, and developed C-suite relationships across the market infrastructure and asset management sectors. Before RBC, he was co-head of research and a diversified financial analyst at UK stockbroker Arden Partners, and was head of research at North Square Capital, served as head of European equity strategies and global head of research at Churchill Capital, and as an investment banking senior associate at William Blair & Co.

AlphaPoint Taps Lewtan Vet Myers as Head of Product

AlphaPoint, a provider of distributed-ledger technology for building digital asset marketplaces, has hired Ned Myers as head of product, a new role responsible for drafting a product strategy roadmap, executing on it, and taking propositions to clients, as well as for marketing and communications functions.

Most recently, Myers was senior vice president of the capital markets and government business lines within the data and analytics division of Black Knight, a Jacksonville, Fla.-based provider of technology and analytics for the mortgage, real estate and capital markets industries. Prior to that he spent 12 years at Lewtan Technologies in various roles, including head of marketing, QA and product, general manager, chief marketing officer, and vice president of marketing, strategy and business development. Before that, he spent a year as sales director at load-testing and performance monitoring technology vendor RadView Software, prior to which he spent a further nine years at Lewtan in various roles, including director of sales and marketing, senior product marketing manager, and customer support manager. He reports to AlphaPoint CEO Salil Donde, who was CEO of Lewtan between 2011 and 2014.

Ned Myers

Derivatives Vet Tessier Named Minium CEO

London-based Minium, a provider of real-time, post-trade technology and services to international investment banks and brokers, has promoted Patrick Tessier to CEO, following the recent departure of Veronica Augustsson from parent company Cinnober, who served as CEO of Minium in her role as group CEO.

Tessier joined the vendor as COO in February 2017 from Citigroup, where he spent seven years as global head of exchange-traded derivatives (ETDs) operations. Before joining Citi, he was EMEA head of ETD operations at UBS Investment Bank, and spent four years as CEO of London and Northern Europe at trading software vendor GL Trade, prior to which he was European head of listed derivatives operations at Credit Suisse First Boston.

Veronica Augustsson

AlphaSense Names Thunnissen CMO

New York-based financial search provider AlphaSense has hired Kate Thunnissen as chief marketing officer, based in New York and responsible for the vendor's marketing strategy worldwide.

Thunnissen was most recently head of marketing at London-based data, trading and analytics provider Dealogic, prior to which she was an executive director at JP Morgan Chase, vice president of advertising at now-defunct online streaming TV platform Sezmi, a senior director at Time Warner Cable, and communications head at McKinsey & Co.'s Stamford office.

Kate Thunnissen

She reports to AlphaSense founder and CEO Jack Kokko, who says her "deep marketing expertise along with unique cross-functional and strategic perspective … will be invaluable in supporting our expansion."

The company announced in June that it had signed its first customer, Marex Spectron, for its new cloud-based real-time risk platform.

StatPro Names Canada Director Ahead of New Structure

London-based portfolio data and analytics provider StatPro has appointed Nico Coetzee director of StatPro Canada, responsible for the vendor's growth strategies in the region.

Coetzee, who is based in Toronto, was previously group executive for internal distribution at South African asset manager PPS Investments, and also served as a financial planning and a business development and marketing executive since rejoining the firm in 2014 after serving a six-year stint there between 2007 and 2013. Between those, he was UK sales director at StatPro, and prior to his first stint at PPS, he was head of business development at South Africa-based Sanlam Investments.

Coetzee's appointment reflects the importance of the Canadian market to the vendor, which runs part of its data processing operations from Canada. The move follows the announcement earlier this year of a new company structure that will take effect in 2019, and the hiring of Gordon Bloor as CEO of one of the new divisions. Bloor will lead the Source: StatPro division, which will focus on market data and index services, while the StatPro Revolution and StatPro Infovest divisions will focus on the vendor's cloud-based Revolution performance and risk analytics platform, and on investment data management solutions, respectively.

Patrick Tessier

Bloor was most recently a consultant at technology M&A advisory firm Goldenhill International M&A Advisors, prior to which he was CEO of Morningstar Real Time, which he joined via the Chicago-based vendor's acquisition of UK-based data vendor Tenfore Systems, where he was also CEO. Prior to Tenfore, he was sales director at Tradeware, and held the same role at Primark following its acquisition of ICV, where he spent eight years in sales and sales management roles. He also serves as non-executive chairman of shareholder analytics provider CMi2i.

Barclays Taps Former Goldman Engineer Brickwood to Head Markets Innovation

Barclays has appointed a former Goldman Sachs engineer to head its markets innovation division. Justin Brickwood will join Barclays as a managing director and head of markets innovation, a newly created role, beginning in September. He will report to Barclays' chief innovation officer John Stecher and will be responsible for client-focused innovation for the firm's electronic offerings, and increasing efficiency in internal platforms.

Prior to Barclays, Brickwood was at Goldman Sachs for more than 20 years. He most recently served as the head of EMEA equities electronic trading engineering. His responsibilities in his new role include enhancing Barclays' platforms to incorporate artificial intelligence, machine learning, and optimization techniques.

Thomson Reuters Rebadges F&R Unit Refinitiv, Names Craig CEO

Thomson Reuters has announced that David Craig, currently president of its Financial & Risk division, will become CEO of the business post-spin-off, which will be renamed Refinitiv.

Craig joined then-Reuters in 2007 as group strategy director, and has served as president of the F&R division since 2012. Before joining Reuters, he was a partner at McKinsey & Co., prior to which he was a principal at management and technology consulting firm American Management Systems.


David Craig

The creation of Refinitiv is the result of a deal agreed in January whereby Thomson Reuters will sell 55 percent of the F&R business to a consortium led by private equity firm Blackstone, which also includes the Canada Pension Plan Investment Board. The new name will take effect once the deal closes in the second half of this year.

Abacus Makes Two Executive Changes

Application hosting service provider Abacus Group has announced two executive-level changes as the company continues to pursue its growth strategy.

Abacus has appointed Paul Ponzeka as its new CTO, while Viktor Tadijanovic transitions to chief strategy officer. Both will be based in the firm's New York headquarters.

Tadijanovic, a founding member of Abacus, was previously CTO and will now be responsible for the overall corporate strategy for the firm, including support for business development initiatives. He will be working on strategic planning with all Abacus teams.

As CTO, he was the principal architect for the company's hosted platform.

Ponzeka has been with Abacus since 2011 and was most recently a managing director of engineering for the firm. Before moving to Abacus, he was a senior systems engineer at Davidson Kempner Capital Management.

OpenFin Hires Ex-Deutsche Data Exec Wood to Boost Enterprise Business

OpenFin, which provides a container-based operating system for deploying and integrating technology and data services via virtual desktops, has appointed former Deutsche Bank exec Stephen Wood as global head of enterprise deployment, to accelerate adoption among financial firms and participation by vendors.

Wood was most recently global head of market data services at Deutsche Bank, where he spent six years, including the role as head of market data, risk and compliance, and was responsible for strategy around data controls, including cost initiatives and strategies around desktop and enterprise application deployments. While at Deutsche Bank, he encountered the deployment challenges that led him to work—first through industry projects, and now directly—with OpenFin.

"My previous experience has been heavily focused on how you bring fintech vendors into organizations and integrate them with an existing environment when they are often pretty niche companies providing cutting-edge services that are up against broader workflows," Wood says. "In the past, I've had vendors come to me with versions of their products that use web deployment, but they need a specific browser—such as Google Chrome—to operate, whereas investment banks tend to have a default web browser, which could be Internet Explorer, for example. OpenFin takes away cross-browser compatibility issues."


Tim Walker

Before joining Deutsche Bank, Wood was a market data consultant at market data and management consultancy Jordan & Jordan, and spent four years as an application specialist at data and trading software vendor CQG, prior to which he held data analyst roles at Dresdner Kleinwort, Instinet and Telekurs Financial (now SIX).

S&P, Thomson Vet Walker Joins Fador Global

Tim Walker, a senior sales executive with more than 25 years' experience in the market data industry, has joined Fador Global Consulting, a Boston-based business development agency specializing in fintech growth companies.

Walker was previously managing director of global channel sales and alliances at S&P Global Market Intelligence, where he spent more than 17 years in various roles, including MD of global sales and client development, having joined S&P-owned Capital IQ as SVP of business development in 2005.

Before that, he was regional managing director for North American sales at Thomson Financial, which he joined via the vendor's acquisition of Worldstreet, where he was senior vice president of sales, prior to which he was a managing director at First Call, where he spent seven years.

He reports to Fador Global founder and managing partner Bruce Fador. W

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15 November 2018
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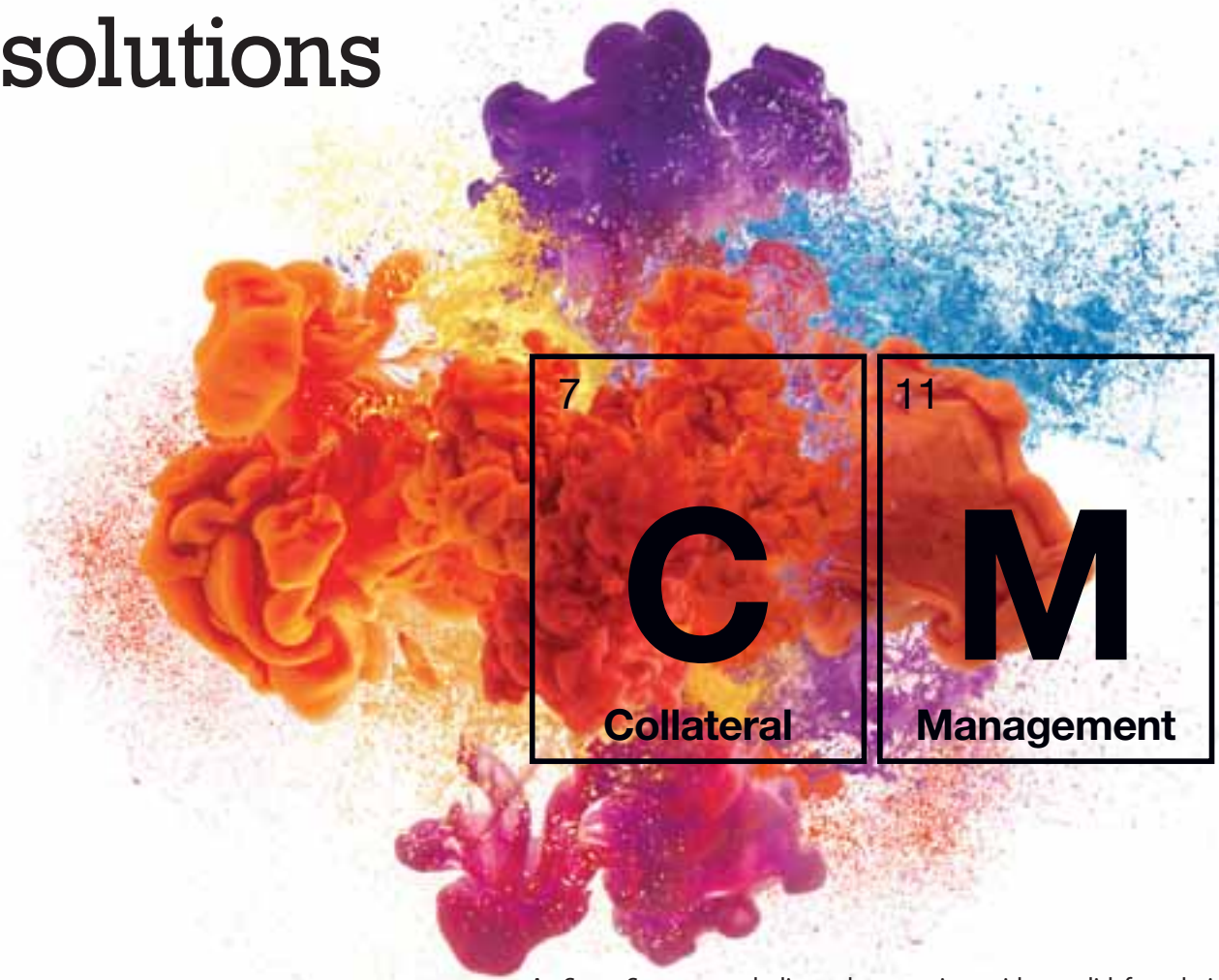

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