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Editor-in-Chief Victor Anderson
victor.anderson@incisivemedia.com
tel: +44 (0) 20 7316 9090
US Editor Anthony Malakian
anthony.malakian@incisivemedia.com
Deputy Editor, Sell Side James Rundle
james.rundle@incisivemedia.com
Deputy Editor, Buy Side John Brazier
john.brazier@incisivemedia.com
European Staff Writer Aggelos Andreou
aggelos.andreou@incisivemedia.com
US Staff Writer Emilia David
emilia.david@incisivemedia.com
Asia Staff Reporter Wei-Shen Wong
wei-shen.wong@incisivemedia.com
Head of Editorial Operations Elina Patler
elina.patler@incisivemedia.com

Commercial Director Colin Minnihan
tel: +1 646 755 7253 colin.minnihan@incisivemedia.com
Commercial Manager Phil Ansley
tel: +44 (0)20 7316 9643 phil.ansley@incisivemedia.com
Business Development Manager Tom Riley
tel: +44 (0)20 7316 9780 tom.riley@incisivemedia.com

Marketing Manager Louise Sheppey
tel: +44 (0)20 7316 9476 louise.sheppey@incisivemedia.com
Design Lisa Ling

Corporate and Single Subscriptions
UK: Claudio De Oliveira tel +44 (0) 207 316 9271
US: Barbara Faiman tel +1 646 736 1852
info@waterstechnology.com

Publisher Katie Palisoul
katie.palisoul@incisivemedia.com
Group Publishing Director Lee Hartt
lee.hartt@incisivemedia.com
Managing Director Celine Infeld
celine.infeld@incisivemedia.com

InfoPro Digital Head Office
Haymarket House
28–29 Haymarket
London SW1Y 4RX
tel: +44 (0)20 7316 9000
fax: +44 (0)20 7930 2238

InfoPro Digital US
55 Broad Street, 22nd Floor
New York, NY 10004
tel: +1 646 736 1888

InfoPro Digital Asia
14th Floor (Unit 1401-3)
Devon House, Taikoo Place
979 King's Road Quarry Bay
Hong Kong
tel: +852 3411 4888

InfoPro Digital Customer Services
tel: +44(0) 1858 438 800

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Relax, the Big Cull Is Over

I've heard a lot of weird and wonderful stories about our industry over the past 16 years, the veracity of which I have had no real cause to question. For example, back in the early 2000s, Deutsche Bank was rumored to have had approximately 10,000 contractors globally on its books, brought on board primarily in response to the bank's concerns around the Y2K crossover at the start of the new millennium. I knew one back-office contractor personally who would turn up for work with a bunch of magazines and his backgammon board, secure in the knowledge that he'd be flicking through issues of *GQ* and *Men's Health* and taking money off his fellow contractors thanks to his backgammon prowess rather than actually doing something directly related to his terms of employment.

I also heard from a reliable source that the Bear Stearns back-office workers in London used to call the month-end weekend "pillow weekend," where they would take their pillows to the office on the last Friday of the month knowing full well that it was unlikely they'd see the outside world any time before Monday morning, such were the volumes of the manual processes they had to manage during the bank's busiest periods.

Needless to say, the global financial crisis pretty much marked the end of those excesses (the small armies of contractors and the all-weekenders), even though in reality the industry had been growing leaner and meaner since the early part of the decade for which technology needs to be thanked.

Are we likely to see the re-emergence of the large-scale culls that we witnessed in 2009 onward once the financial services industry took its first baby steps toward recovery in the wake of the worst financial crisis since the 1930s? No, defintely not. In fact, if history were to repeat itself and job losses on such a scale were to transpire, there would literally be no one left in the industry. However, there is a very real possibility that due to the advancement of certain technologies—artificial intelligence and robotic process automation, for example—we could see small numbers of capital markets layoffs and the redeployment of staff to more value-added roles that technology cannot manage … yet. That scenario is part and parcel of the growth and maturation of any industry, and ours is no different—it has been ongoing for years. But in the same vein, all capital markets workers should be aware of the technology-induced changes coming down the pike, and contemplate what they might mean to them and their day-to-day roles. W

Victor Anderson
Editor-in-Chief

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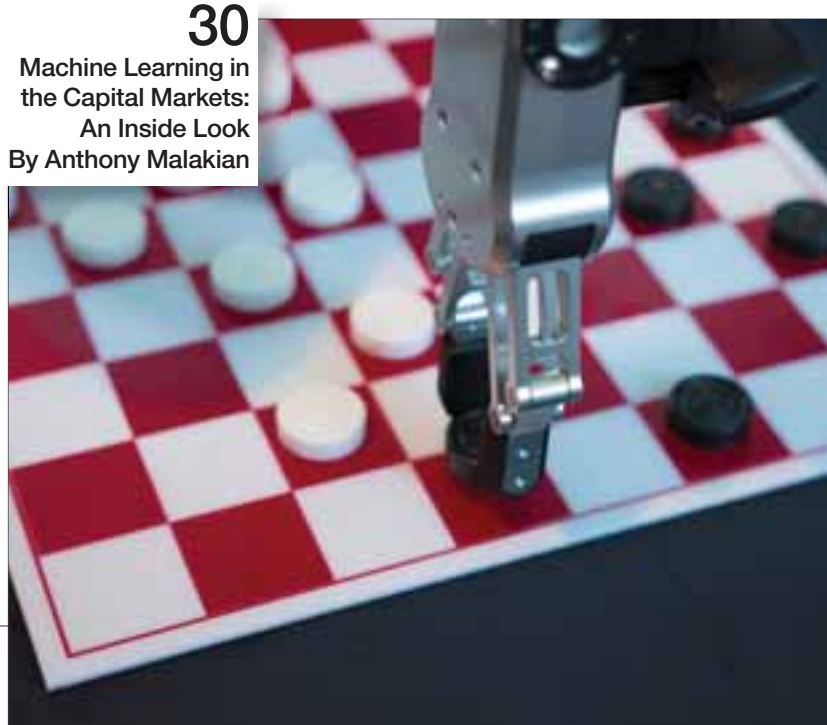
Contents

Drew Shields
Trading Technologies

September 2017

16
Settling Down: How the US Finally Embraced T+2 By Emilia David



30
Machine Learning in the Capital Markets: An Inside Look
By Anthony Malakian

34
John Brazier: The Existentialist Dread of Robotics

Dealers Push for Delay of European Derivatives Trading Obligation

'Challenging,' 'significant concerns,' 'foolhardy'—these are some of the terms used by the financial industry to describe the incoming obligation for certain derivatives to trade on-exchange starting in January 2018, a move that some are urging European regulators to delay. By James Rundle

As part of the Markets in Financial Instruments Regulation (Mifir), certain derivatives will only be allowed to trade through recognized platforms such as multilateral trading facilities (MTFs), regulated markets, or a new form of venue created for this purpose, organized trading facilities (OTFs). "While the International Swaps and Derivatives Association appreciates that there is political will to ensure that the trading obligation comes into force as soon as possible, we have significant concerns that the proposed timeline could risk effective implementation," Isda said in a response to a consultation on the trading obligation from the European Securities and Markets Authority (Esma). Esma published the responses on August 10.

European lawmakers would like the trading obligation to take effect on January 3, 2018—the effective date of Mifir, and its accompanying directive, known as Mifid II, with phase-in periods at later dates depending on the size of the financial institution.

However, Isda and other groups expressed concern over the time this would allow the industry to create connections between their systems and OTFs, or even to go through the onboarding process for a new venue, as OTF approvals are not expected until late 2017 at the earliest.

The Securities Industry and Financial Markets Association's (Sifma's) asset management group said Esma's proposed adherence to the January 3 deadline was concerning.

Regulatory equivalence was cited as one of the primary reasons that a delay is needed. The US has had a trading obligation in place since 2014, and any EU rules on this topic will have to undergo a process by which the European Union (EU) and the US deem each other's rules as broadly in line with each other.

Timothy Massad

This may not be a simple task—the European Commission (EC) and the US Commodity Futures Trading Commission (CFTC) spent nearly four years debating whether their derivatives rule-books were equivalent, arguing over details such as margin period of risk. They finally reached agreement in 2016, but the key figures that reached the agreement, Timothy Massad at the CFTC and Lord Jonathan Hill of the EC, are no longer in their posts.

"We remain holding very significant concerns that the proposed timeline could risk not only effective implementation but also material damage to the functioning of global markets for reasons that broadly fall into two categories—operational issues and equivalence," said the Wholesale Market Brokers' Association (WMBA) in its response. "At risk here, is that liquidity fleeing an uncertain regime will never return."

Suggestions for the length of any such delay varied by respondent. Barclays suggested a "small" delay of one month, to February 2018, to allow the industry time to comply.

Others, such as Isda, suggested longer timelines, with one suggestion being three months after an equivalence agreement with the US at the very least is reached, or three months after Esma's technical standards are published in the Official Journal of the EU, whichever is longer.

However, not all respondents were in favor of a delay. Electronic trading giant Citadel said that as category one and two participants—the very largest derivatives traders on the buy and sell sides—were relatively limited in number, the trading obligation should move ahead as planned.

Likewise, the Managed Funds Association said that as many firms have been trading through swap execution facilities in the US since 2014, complying with a similar regime for OTFs should not be an issue, as long as smaller participants are given time and that the trading obligation is aligned with the clearing obligation for those derivative classes. "These market participants should be ready to meet the proposed compliance deadlines under the trading obligation without facing operational difficulties or incurring substantial on-boarding expenditures," it said.

Esma could not be reached for comment. W

THE BOTTOM LINE

- Influential trade bodies are pushing European regulators to delay a key part of post-crisis derivatives reform, saying that the regulatory and technical environment will be too uncertain on January 3.
- Critics say that any obligation should be delayed until European rules are recognized as equivalent by the US and other jurisdictions, or this could fragment trading.
- However, some prominent buy-side firms do not see a problem with the timeframe, and argue that most major dealers will not have issues connecting to new or existing venues in time.
- The European Securities and Markets Authority will release the timeline with the final form of its standards later this year.

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When it Comes to IT Spend, RegTech Sees a Green Field

While pre-, post-, and at-trade needs—along with risk management tools—will continue to garner the most attention when it comes to IT spend, the regtech space is poised to expand thanks to a change in regulatory focus. By Anthony Malakian

A new report released by consultancy Opimas, titled *FinTech Spending and Innovation in Capital Markets*, estimates that total spending on IT across all market participants in the capital markets will amount to over $127 billion in 2017. The report then breaks that number down between six categories: pre-trade, at-trade, post-trade, capital structure, risk, and the new buzzword garnering great interest: regtech.

Corralling the most investment are those in the trade sector: pre-trade ($41.7 billion), at-trade ($33.3 billion), and post-trade ($21.9 billion). Opimas predicts that these areas will see continued investment. Additionally, risk tech will also continue its ascent—currently at $23.6 billion, according to the report—while capital structure will be the sleepy nook of fintech at $2.5 billion. But tech spend as a whole will continue to rise as financial firms become more tech-focused. As a result, and thanks to a change in the regulatory landscape, the regtech space is poised for the greatest spike, but not necessarily for the reasons you might think.

Bodies

"I was surprised by the fairly low-level of spend on regtech because it's an area that's received so much attention," according to Opimas' co-founder and CEO, Octavio Marenzi.

The industry has been dealing with a raft of new regulation since the financial crisis, and, according to Marenzi, between 20 and 25 percent of operating budgets for some banks is spent on compliance. While investment firms have spent billions to answer these new mandates, the plan has largely centered on throwing bodies at the problem.

Octavio Marenzi
Opimas

One executive at a large bank tells *Waters* that while people talk generally about Dodd–Frank or the revised Markets in Financial Instruments Directive (Mifid II), each of these are glaciers with complicated amendments and subsections. There's confusion by the time it filters down from legal to operations and technology. So for most, the aim is to hit the ground running, and then to adjust over time.

"So human resources are more beneficial than paying for a new system," says the source. "You can't bring in a new system and tailor fit it to our needs when it takes two years just to figure [the rule] out. So you keep throwing bodies at the problem."

Ironically, it may take some semblance of regulatory stability to settle in before the regtech investment gets flowing, says Marenzi.

"The easiest thing to automate is something that's very repetitive where you have lots of transactions that are very similar and they don't really change over time. Compliance has always been a bit weird—the rules change and are subject to interpretation, and you sort of fudge the numbers at the end of each quarter to make them look good. That's not something that lends itself well to automation," he says.

"But I think we've reached a sort of high-water mark in terms of regulation because some sort of stabilization is taking place," Marenzi continues. "In Europe, Mifid II is the last big thing coming out; in the US, it's sort of plateaued and there's not any sort of major regulatory change in the works—there are some new rules, but overall it's stable. Once you have stability you can automate things and get rid of some of these headcount increases that we've seen in compliance."

Pre-, post-, and at-trade activities are still the most intriguing for investment as artificial intelligence, robotic process automation, blockchain, public clouds and new visualization tools gain maturity. But those are already highly competitive fields. Comparatively, according to Opimas, regtech, as it pertains to investor relations, market structure and, to lesser extents, regulatory reporting and financial crime, has room for new entrants.

Take, for example, the financial crime sector, which already has stalwarts including NICE Actimize, Nasdaq, FIS and Bloomberg offering services. But this summer, IBM entered the space. And Marenzi points to upstarts like Behavox, TradingHub, and Sybenetix, which was recently acquired by Nasdaq, as interesting new entrants. As much as the term regtech has been overused, it is an area where we're likely only at the beginning of its evolution. W

THE BOTTOM LINE

- Opimas estimates that spending on financial IT will hit $127 billion this year.
- Technology specifically geared toward pre-, post- and at-trade requirements will take up the vast chunk of that investment, but regtech is poised to see significant growth in the years to come.
- One major reason for that is stability, as the regulatory environment, globally, isn't as in flux as it was in, say, 2012.

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Brexit Brings Boom to Bankenviertel as Tech Firms Eye Frankfurt

The question of whether or not the banking industry will stay in the UK after Brexit seems to have been largely answered—with a resounding 'nein'—as major banks announce plans to shift jobs to Frankfurt in the months and years to come. Now, vendors are beginning to respond. By James Rundle

Datacenter operator Equinix announced in June 2017 that it would be opening a new "flagship" facility in the German city, adding to its extensive presence there already. In April, Chinese internet giant Tencent also announced that it would be opening four more datacenters to support its Tencent Cloud business, located in Mumbai, Seoul, Moscow, and Frankfurt.

At the beginning of 2017, Microsoft and consultancy KPMG unveiled their joint "blockchain nodes"—a term used to describe innovation centers—in Singapore and Frankfurt. Further expansion to New York is also planned.

The inward investment agency of the region, FrankfurtRheinMain, also sponsored a delegation of business leaders and politicians—including the mayors of Frankfurt and nearby Offenbach—to New York on June 26, which discussed options after Brexit and the region's desire to attract fintech companies.

One of the most recent announcements to focus on Frankfurt is the launch of managed hosting, co-location and connectivity services from Transaction Network Services (TNS). The company announced that it would be hosting the service in Equinix's FR2 datacenter.

"Frankfurt has always been an important market center with both the Xetra and Eurex markets being based there," says Alex Walker, executive vice president and managing director of TNS' financial services division. "The growth in the equity derivatives and interest-rate markets, combined with the adoption of electronic trading to improve efficiencies, means trading firms are increasingly seeking cost-effective ways of accessing those markets as well as managing risk."

Walker says that while Brexit was not an "influencing factor" in its decision to launch in FR2, the company is now "in a very good position to offer our clients managed infrastructure services if they decide to choose Frankfurt as their European base."

City of Banks

A primary reason for relocating to the Eurozone is that the UK is widely expected to lose so-called "passporting" rights once it withdraws from the European Union (EU), which allow UK-based firms to export their services throughout the EU. And Frankfurt is an alternative to London due to the presence of major EU institutions, including the European Central Bank (ECB), along with exchange giant Deutsche Börse, which has its headquarters in the Frankfurt suburb of Eschborn.

Deutsche Bank, Commerzbank, Deutsche Bundesbank and DZ Bank are other major players that have headquarters in the Bankenviertel—Frankfurt's central business district.

"Frankfurt is a key contender, boasting proximity to the ECB and a long history of financial competence," said RBC investor and treasury analysts in research published on June 1. "With euro-denominated trading already well-established, and a booming fintech scene emerging, Germany's City of Banks may bolster its status as a world-leading financial hub."

There was some debate after the UK voted to leave the EU as to whether Dublin, Paris or other European cities would end up benefiting more from the move than Frankfurt. Indeed, JPMorgan and Bank of America, which have existing offices in Dublin, are understood to be favoring the Irish capital, as are large buy-side firms, owing to the city's preeminence in fund administration and asset servicing.

But media reports and comments by senior executives have all suggested that banks such as Citi, Goldman Sachs, UBS, Morgan Stanley and Daiwa Securities Group will either open Frankfurt-based subsidiaries or expand their existing headcounts there in the months to come. It appears that London is set to lose out in the long term. An Oliver Wyman report estimates that while most banks are only moving small numbers at present, London could lose up to 40,000 jobs in wholesale banking over the long term to European rivals—roughly half its current headcount for investment banking, sales and trading and related areas. W

THE BOTTOM LINE

- London is certain to lose hundreds of financial-sector jobs in the short term to Frankfurt, and other European cities to a lesser extent.
- Less reported is the fact that technology companies servicing these industries are now also beginning to announce new services and initiatives in the Eurozone, as banks begin to select their post-Brexit headquarters.
- Consultants estimate that, in the long term, up to half of the wholesale banking jobs currently based in London could migrate to the Eurozone.
- Similar estimates for tech vendors, many of which are privately held, are impossible to obtain at present, but experts suggest an exodus may be imminent, if Frankfurt emerges as the destination of choice.

Brown Brothers Harriman Wades into RegTech and Robotics

Michael McGovern, Brown Brothers Harriman's former CIO and now head of fintech, talks about his new role and how disruptive technologies are changing how BBH interacts with asset managers and fintech firms. By Anthony Malakian

Last month, Brown Brothers Harriman (BBH) named Michael McGovern—who had been enterprise CIO for four years—as its global head of fintech, a newly created role that includes oversight of its data management arm, Infomediary, which has over 200 asset managers and financial institutions on its platform.

The position is designed to bring together BBH's data and technology solutions and to guide it as it increasingly interacts with the fintech world.

"We're competing against our traditional competitors, but also against technology companies," McGovern says. "But we're competing against those [technology] companies with a proposition that is framed as 'best-of-breed' from a fiduciary perspective, because we use it ourselves, we're a highly regulated bank, and this business sits within our investor services franchise." Other firms are going down this path, though it's not as common to see a firm take its CIO to head this endeavor.

Striking a balance is key when incorporating new technologies that operate alongside hulking legacy systems. Each technology and tech provider has its own risk profile, so it's important to find those companies that align with the institution's standards.

"What works for a minimum viable product for a fintech startup may not pass muster with the likes of a bank or securities regulator," he says. "We have to be very careful about how we leverage disruptive capabilities, so that we don't get off the reservation in terms of the risk profile and all the good work that's been done in the industry."

Michael McGovern
Brown Brothers Harriman

But there are opportunities to be had. For example, over the last five years Brown Brothers has invested heavily—through its BBH Labs group—in robotic process automation (RPA) technologies and other machine-learning techniques. Through a program called Process Revolution, BBH has used RPA to help improve client onboarding and interaction.

"RPA is not just building the bots; it's getting the bots to do the right things in the right order. So there's a process reengineering element to this," he says. "We've built a couple of bots now and probably the most successful use-case is around account opening."

BBH is looking at a spectrum of bot technologies—from back-office processing to exception management, to chat bots and other technologies used to engage with clients. As one of the largest asset servicers, the firm has a high-touch business when it comes to how it interacts with asset managers and other financial institutions. RPA is not about removing the human experience; it's about removing mundane tasks from the desks of humans and streamlining them via bots.

"We're nowhere near the point where [Apple's] Siri will take over for client-service managers; that's not on the cards anytime soon," he says. "The way I think about augmented intelligence technology—whether it's natural language processing, machine-learning techniques, algorithms applied to data that we have, or to RPA—I think of all of it as we're moving drudgery from the activities that we perform on behalf of our clients." Shifting these tasks to machines, he says, allows those individuals to focus on more pressing client needs.

THE BOTTOM LINE

- To better address pressures coming from both traditional competitors and emerging startups, Brown Brothers Harriman moved its CIO to the newly created position of global head of fintech.
- BBH has invested heavily in RPA to help better onboard clients.
- It's also dived into the regtech space, which led to the development of InfoNAV, which helps funds to produce NAVs and NAV oversight.

The Tech of Reg

When it comes to emerging technologies, some are more aspirational and years away from fruition, while others are ripe for the picking. McGovern views the regtech space being in that latter bucket, and says that while some people view the regtech space as a mirage, he thinks it has staying power.

"There's a legitimate need and opportunity for fintechs to step into the regulatory space and deliver regtech capabilities that mature firms would struggle to build themselves," McGovern says. "That's an area where we are beginning to focus."

Over the last three years, BBH has been developing a new product called InfoNAV, which helps funds produce net-asset values (NAVs) and NAV oversight via a software-as-a-service (SaaS) model. It allows users to track the activities their administrators must complete on time, such as fund oversight, so that the fund can have independent calculations in case something goes wrong at the administrator level. W

Liquidity—Bringing it all Together

Cash and liquidity management systems are becoming increasingly sophisticated, with firms prioritizing projects that can help meet regulatory requirements and deliver improved efficiencies for the business. In a bid to optimize liquidity management, the market has seen firms move toward intra-day models and global liquidity engines. Tine Thoresen reports.

After the fall of Lehman Brothers in 2008, it took some firms days—or even weeks—to identify holdings and positions and, in some cases, liquidity dried up in the process. To avoid this happening again, the changes made in the past years have been profound—new regulation has forced firms to hold more liquid assets such as cash or government bonds, and there has been innovation in the market. Regulators have been busy bringing out new requirements designed to protect the financial system from future crisis, and firms have responded by making substantial investments in initiatives crafted to meet new requirements and create a more robust financial system.

Regulations such as the Dodd-Frank Enhanced Prudential Standards, the Basel Committee on Banking Supervision's (BCBS) Principles for Sound Liquidity Risk Management and Supervision, the International Organization of Securities Commissions' (Iosco) Principles of Liquidity Risk Management for Collective Investment Schemes and Federal Reserve CFR 249 Liquidity Risk Measurement Standards are all raising liquidity thresholds and further narrowing the neck of the collateral bottle.

To justify large reform programs—investments that, in some cases, could impede businesses' ability to exploit other opportunities—firms are increasingly focused on achieving greater value from the work that goes into upgrading systems and processes. This has resulted in projects aimed at meeting regulatory requirements, as well as improved operational efficiencies and more effective control of cash and liquidity management.

The first projects seen to address liquidity regulation after the financial crisis were focused on moving treasury books into highly liquid assets such as cash, government bonds, covered bonds and, to a lesser degree, corporate bonds. Since then, regulators have given guidance on how to address liquidity management. In January 2013, the Basel Committee published *Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools* that set out liquidity coverage ratios (LCRs), which required banks to have at least 60 percent coverage of highly liquid assets to cover their net outflows over a 30-day stress period by 2015. These requirements will increase step-wise to 100 percent LCR by January 2019 and, to meet Basel requirements, many firms have identified the need for greater insight into assumed net cash positions, fueling investments in projects designed to improve efficiencies in asset liability management.

The cost of holding very liquid assets has in recent years resulted in low yields, making it essential for firms to get the balance right to avoid holding excessive low-yielding assets at an expense of higher-yielding ones. Due to the risk of regulatory breach and the opportunity for cost savings when getting the LCR right—avoiding the need to boost liquidity through costly intra-day borrowing—projects aimed at delivering improved cash and liquidity management have climbed the agenda, and the focus has been on retiring legacy systems, streamlining processes, reducing manual intervention and ensuring more timely access to data.

The evolution of regulation and the introduction of additional requirements for intra-day liquidity management—as well as the cost-saving potential for intra-day management—have taken projects to the next level. "Everything is moving to an intra-day model," says Kurt Eldridge, executive vice president, global sales, SmartStream. Regulation has been a key enabler for the move to intra-day, and even forward-thinking firms that already had capabilities for intra-day liquidity management have made improvements by, for example, incorporating external data to get time stamps on debits and credits to meet new reporting requirements.

The details on how banks should handle management of intra-day liquidity risk were set out by the Basel Committee in *Monitoring Tools for Intraday Liquidity Management* (BCBS 248), and the new reporting requirements have fueled further investment in cash and liquidity management systems.

At Raiffeisen Bank International (RBI), the new regulation led to the firm working with SmartStream and implementing SmartStream Corona Cash & Liquidity—a central tool to monitor and control all aspects of cash and liquidity management. The bank previously built intra-day cash and liquidity management tools internally, as intra-day management had been an ongoing priority, but Basel III introduced the need to source external data, resulting in enhanced visibility into cash positions. Wolfgang Pollak, senior asset liability manager, RBI, says that, in addition to meeting the new Basel reporting requirements, the project resulted in the bank improving its knowledge of what liquidity it needs to hold because of closer monitoring of nostro accounts and better understanding of cashflows.

RBI's proactive approach has created a robust foundation for cash and liquidity management opening up new opportunities for the firm. "The first step is to monitor your external liquidity. and the next step is to monitor your internal cashflow and your customer accounts where you're the manager," says Pollak, explaining that this would be useful for stress testing.

Under Basel III, LCR is calculated on assumed net cashflow for a 30-day stress period, making stress testing essential for the efficient management of liquidity. For firms going forward, it is now about improving the models by getting the inputs right, improving a firm's ability to meet regulatory requirements, as well as resulting in more efficient management of liquidity and potentially resulting in higher yields on its liquidity portfolio. "If you're running stress tests, you need to model what outflows can happen in times of stress and, to get a more accurate model, you need to know the behavior of your customer, which you only get if you monitor what they're doing," says Pollak, who adds that this would also help the firm improve its own liquidity steering.

Following Basel III, banks have been in continuous dialogue with their local regulators, as it is up to these regulators to approve the stress testing used to calculate LCR to ensure it is appropriate to the business model. Pollak says RBI is now aligning stress assumptions, building out stress tests and validating stress models, as stress testing is an important factor in defining LCR and how much liquidity the firm needs. Getting the models right to potentially reduce the buffer is vital for a bank's performance, and could lead to better allocation of excess liquidity to increase returns.

To achieve this, firms need quality data, integrated systems and tools that enable intra-day customer behavior analysis. Pollak says the firm needs to identify when most payments are affected, as well as the timings and the amounts. "You're almost forced to know your customer-base behavior better, which is definitely an advantage," he says, adding that firms would previously have been looking at this data on an end-of-day rather than an intra-day basis. The improved insight into customer behavior could see the firm being able to give more information to customers on the timings of transactions, which would in turn enable the customer to do more, explains Pollak.

Going Global

There is also a trend toward banks increasingly managing liquidity as a service for customers, as well as their own. To do this effectively, banks are finding they would benefit from moving away from viewing data in disparate systems, and are instead building an integrated view of cash and liquidity and other datasets required for the service, such as costs. In Europe, it is now the Markets in Financial Instruments Directive (Mifid) II that is setting the agenda for many operations projects and, as part of preparing for Mifid II, firms are looking to gain increased visibility into the details of cost allocation. When monitoring a client's liquidity they need to understand the cost every step of the way, allocating costs either to the client or to the firm. "The only way to do that is to bring together cash, collateral, corporate actions, and so on, to understand the details," says Darryl Twiggs, senior vice president, strategic initiatives at SmartStream.

Bringing together cash management systems with intra-day liquidity, collateral and corporate actions management appears to be where the market is now moving, and a combination of past market events and regulation are seen as the background to this. The continuous wave of regulation has led to increased sophistication in the market when it comes to liquidity management. SmartStream, which offers cash and liquidity management software solutions that enable banks to break down silos with an enterprise-wide solution for cash management, treasury management, exceptions management and reconciliations management, has recently entered discussions with customers wishing to set up internal liquidity utilities.

A liquidity utility would manage the global liquidity position for a firm, taking data from multiple entities and aggregating the balances to show the liquidity for the firm. "Many firms have some more local capabilities, looking after their own business, but regulators are now looking for firms to report their global liquidity as well," says Twiggs, explaining: "SmartStream is now seeing potential customers asking to accommodate other sources, including securities—in the form of collateral, and market activity, in the form of corporate events—that also have the concept of a utility."

By integrating more sources, the aim is to have real-time monitoring of liquidity that goes across cash and securitized collateral. For SmartStream customers, these projects leverage the fact that all SmartStream Transaction Lifecycle Management (TLM) solutions are based on a single architecture, making it possible to integrate TLM Cash & Liquidity Management, TLM Corporate Actions Processing and TLM Collateral Management. "We deliver our solutions so that they can be integrated," says SmartStream's Eldridge, adding that projects aimed at centralizing and integrating systems will help firms achieve a complete view of settlement, messaging, what is predicted to be settled and the valuation of collateral against the market.

Under the Basel requirements for intra-day liquidity monitoring, collateral is also mentioned, further strengthening the business case for having an integrated view of short-term liquidity steering and collateral. This is already done at the entity level at RBI, and the next step would be to set up a global hub, which, explains Pollak, can offer a firm increased oversight and be beneficial from an information perspective.

An enterprise-wide liquidity engine could be an additional way of further improving cash and liquidity management and centralizing data, but there will continue to be a need for liquidity management at the entity level, too. "Working in different markets, it's not always possible to shift liquidity from one entity to another," says Pollak, explaining that capital restrictions can hinder movement of cash and collateral between countries, which means it is difficult to have a worldwide view of liquidity monitoring without the country-level focus.

For firms in the process of setting up a global liquidity engine, one challenge they could be looking to address is collateral management. "Collateral is a sensitive topic as its liquidity can be questionable," says Twiggs, citing an example that, if a firm holds US dollars as collateral to cover euro trading, the regulator would question the liquidity of the dollar and its value when needed to convert to euros. In other cases, collateral could be under scrutiny by regulators if the liquidity of the assets is questionable.

As regulatory costs have continued to increase, the focus will remain on identifying ways of enabling banks to maximize returns within the requirements set by the regulators. And the winners are the firms that have first-class systems for monitoring liquidity intra-day—systems that are integrated with cash, collateral and corporate actions, and enable the firm to get quality data for stress tests and make sound assumptions about collateral. W

ENTER THE ROBOTS

Reconciliations' Automation via Robotics

Automation through technology has long been regarded as a strategic objective for capital markets firms' middle and back offices as they seek to reduce operational costs and increase efficiencies. Robotic process automation is now building a head of steam for this very purpose and the reconciliations space appears to be the prime area of operations for large-scale implementation, although reservations regarding the technology's suitability still need to be addressed. By John Brazier and Victor Anderson

Reconciliation is hardly the sexiest part of trade processing. While it's an undeniably key process whereby capital markets firms aim to ensure that the money leaving an account matches whatever is spent with the view to balancing those accounts at the end of a recording period, the significant proportion of this work is still carried out via spreadsheets in a manual, time-consuming manner.

As such, this can be a problematic space for many firms, particularly those on the buy side seeking to reduce the operating costs intrinsically linked with maintaining legacy platforms. A survey conducted last year by PwC's Financial Services Institute, *Robotic process automation in financial services*, found that 57 percent of financial services firms had carried out proof-of-concept projects with robotic process automation (RPA) technology—software tools that follow a pre-defined set of rules to complete tasks based either on structured or unstructured data—although only 4 percent said they had conducted widespread implementation across the organization.

The potential that RPA holds to improve the reconciliations process is huge; by removing the manual work carried out by human staff,

"With lower effort, sometimes greater 'coverage' becomes feasible, for example, if a company was managing market visibility manually so they could cover only certain market segments, but now using RPA they can manage full market coverage intra-day."
Rashed Haq, Sapient Consulting

often taking up several hours each day, financial institutions have the opportunity to greatly increase business process efficiencies and transform the roles that back-office staff currently play to lay the foundations for future technology implementations.

"Reconciliations, for most firms, are a process of running reports, concatenating data, reviewing exceptions, applying thresholds or overrides, and basic math/mapping," says Rashed Haq, global lead for artificial intelligence at Sapient Consulting. "The vast majority of these related sub-steps could be automated in time with RPA. The process of reconciliation, in some cases, may result in process re-engineering and design, and will result in exception-based management of reconciliation. Appropriate controls and additional reports for validation will need to be created for process controls."

Introducing Robots

Haq believes the reconciliations space is primed for the introduction of RPA, particularly when combined with elements of artificial intelligence, resulting in intelligent process automation (IPA). The information required to conduct the process can be sourced from different formats in a much quicker and more effective manner, while the analysis of any differences—including root-cause analysis, estimating placeholder fields or the action required to correct the differences—can be conducted on a 24/7 basis. "With lower effort, sometimes greater 'coverage' becomes feasible, for example, if a company was managing market visibility manually so they could cover only certain market segments, but now using RPA they can manage full market coverage intra-day," Haq says. "Besides efficiency, time compression will be a key aspect of applying RPA—as opposed to reconciling once a week or monthly, you can potentially reconcile information almost in real time."

However, the use of RPA within the reconciliations process isn't always going to be a straightforward exercise and complexities will arise when reconciling unstructured data, such as images or PDFs.

"Additionally, some products such as loans and P/E (price/earnings ratios) may be more opaque, which may be harder, and will require information interpretation," Haq explains. "Generally speaking, we find that most steps aside from root-cause analysis (RCA) are automated. RCA is the process where new issues are discovered and then new RPA bots can be set up to address these going forward."

Rocky Martinez, CTO at London-based reconciliations specialist SmartStream, says the vendor has been integrating elements of RPA into its technology portfolio for the past 12 months, as industry skepticism regarding robot-led automation fades.

"Banks have gotten over the 'this is my proprietary data; no one else can touch it' mentality," he explains. "We have taken over maybe 10 different back-office reconciliation functions from banks of different sizes, some small and some large. Banks have overcome their initial fears and are now in a place where they realize that there is no risk of data leakage and they want to reduce their costs through outsourcing. This new attitude lets us introduce RPA and apply the technology to complete redundant tasks."

Martinez says that while there are a number of sell-side firms currently using RPA for know you-customer (KYC) purposes and other basic automation functions, more institutions on both sides of the street are starting to stick their toes into the water. "Buy-side and sell-side institutions may not have a clear understanding of what RPA can do, but they have a clear understanding of how this will affect them, and frankly since their outsourcers have already been quick to embrace this new technology, they are in all likelihood already benefiting from it," he explains.

Limited Capabilities

However, there are those who take an opposing view to Haq and Martinez, that RPA, at least in its current state, is a limited technology that isn't yet sufficiently developed for widespread implementation within the capital markets. Gurvinder Singh, CEO of

New York-based buy-side technology provider Indus Valley Partners (IVP) is one such skeptic.

"We believe RPA is useful for simplistic rule-based process automation use-cases only, such as data entry jobs, double/triple journal entries, processing of invoices, or basic checks done at clerical levels in various processes," says Singh. "Reconciliations in the capital markets is much more involved and requires knowledge or nuances specific to asset types. The fact is that if an asset setup is incorrect, that is the root cause of the break."

IVP has, however, taken steps to introduce RPA technology into its reconciliations services in the form of RoboRecon, which it unveiled last year, although the firm is focusing more on the adoption of artificial intelligence going forward, as opposed to the more limited capabilities robotic software currently offers. Singh claims that the latest version of its AI engine predicts 60 to 70 percent of user actions accurately and can enhance that efficacy over time, leading to a significant reduction in required bandwidth. "Standalone RPA is not that useful as an automation of a static rules/process," he argues. "Proper machine learning coupled with the concept of a break-management lifecycle offers the potential for significant savings of time, effort and cost for the buy side, as demonstrated by our RoboRecon capability already being leveraged by our clients."

Singh's argument is underpinned by the fact that RPA tools can suffer from what he calls "maintenance malaise of quality assurance automation," whereby scripts must be continually updated, tested and deployed every time a system is upgraded or the user interface is changed. "You can get value from RPA tools only if your system environment is frozen in time, but they will not do any higher-level improvements by changing or eliminating an outdated process," he explains. "It's a very natural use-case, but only if there is AI being leveraged. If it is used as a hard-coded replication of a process with no learning capabilities, it will not yield any valuable results."

Gurvinder Singh
Indus Valley Partners

Human Cost

As with any discussion concerning robotic technology and artificial intelligence, the issue of human redundancy and replacement comes to the fore. SmartStream's Martinez makes reference to an experiment carried out by Facebook earlier this year—where two chatbots were encouraged to negotiate a trade between themselves and ended up creating their own language before being hastily shut down—as

a reminder that firms must still exercise caution when approaching artificial intelligence. "As we get more comfortable with AI, that part of our technical world will start playing into RPA, where rules will start getting refined as the AI engines pick up more information and are able to discern different patterns. I can't predict when that will happen, but it will eventually," he says.

The existential fear of being replaced by robots and intelligent machines is likely to linger as long as the reality of what the technology can actually do is misunderstood. Martinez says that while RPA tools can be robust or intelligent enough to tackle onboarding of new feeds or generating new rules, or at least the first pass of the rules, back-office staff that were previously spending several hours each day conducting repetitive tasks could then be utilized in new ways that also increase technology knowledge throughout the firm.

"You will always need human intervention to understand some of the nuances of the feeds, but if the robot is robust enough to get the first 70 to 80 percent of the feed, that would be another function where it could play well," he says. "As they get the results, they will begin to move a bit faster, but I don't see any of the large banks or buy-side companies letting a significant number of people go. They run pretty lean already and I see this more as an enabling technology helping people work better and smarter."

While those institutions may not want to make significant reductions in headcounts in favor of RPA systems, the issue of cost is one that cannot be ignored and the introduction of greater automation has been a tried-and-tested method of achieving that result. "Finance and banking are the perfect industries for RPA with their ever-increasing need for profits and constant efforts

Rocky Martinez
SmartStream

to decrease expenses," says Martinez. "Some financial analysts are even saying that revenue may only increase by as little as 1 to 2 percent, or even stay flat in some areas, and they will need to increase profit by reducing operational costs."

Although many institutions on both the sell and buy sides are driving down operational costs wherever possible, technology costs will rise in tandem, particularly when it comes to implementing new systems. Ultimately, it comes down to how long firms will be willing to wait before realizing a return on investment, which is particularly relevant at a time when many firms, especially on the buy side, are unwilling to take risks on sinking money into new technologies during significant regulatory upheaval.

Candid Expectations

IVP's Singh is candid about his firm's stance with respect to RPA and the extent to which the technology might impact various reconciliations processes. "We're not huge fans of RPA right now, although we definitely see some interesting use-cases for RPA—including reconciliations—but I think RPA in its current form is inadequate. I'm not saying that RPA isn't useful in the reconciliations space, but RPA in its current form is not going to create the kind of leverage that we might all imagine."

So, according to Singh and IVP, if RPA doesn't hold the key to supporting more automated, transparent and accurate trade processing and accounting, what does? Singh says the answer lies with algorithms and their ability to learn from past outcomes so that they become more adept at spotting and fixing anomalies as soon as they arise.

"Usually I can achieve about 90 percent [automation] with simple rules, but it's the 10 percent where all the errors occur, which creates that risk," he says. "If I can take another 6 to 7 percent out of that—and these are numbers that we are able to achieve in our lab running live portfolios with different asset classes—that leaves only about 4 percent that would require manual processing. We're talking here about cutting the operational bandwidth by about 50 percent. We think that's a huge change and the right way to go because these algorithms can learn and improve rapidly over time."

And in an ideal world, what does the ultimate reconciliations framework look like from an operational and technology perspective? "The dream we are all chasing is the scenario of matching utilities leveraging some kind of blockchain, which should almost obviate the need for reconciliations," Singh explains. "But unfortunately, it doesn't look like we are anywhere near that right now," he adds. W

SALIENT POINTS

- Robotic process automation is beginning to gain significant traction among capital markets firms as an efficient method of automating middle- and back-office processes such as reconciliations to reduce operating costs and manual errors.
- While large-scale implementation of RPA for reconciliations may be a few years away, firms are already using the technology for other, time-intensive and manual processes. The limited capabilities of the technology is also leading to some reservations, as the more nuanced elements of reconciliations still require human intervention.
- The integration of RPA with artificial intelligence presents a clear option for the future of reconciliations, as the combination of robotic tools that are able to generate new rules and learn from previous scenarios could lead to further efficiencies from pure RPA implementation alone.

Settling Down: How the US Finally Embraced T+2

Twenty years after the US adopted T+3, the financial industry will finally move to a two-day settlement cycle on September 5. Industry players reflect on the long journey to T+2 and what lies ahead. By Emilia David

Nothing good happens between trading day and settlement day. For years, that has been the mantra of the financial services industry. Keeping risk at a minimum while waiting for a security to be cleared has been an operational and technical challenge, but despite this, it has taken two decades for the industry to shorten the settlement cycle.

T+2, or the settlement of a trade two days after execution, is ready to be implemented on September 5, 20 years after the industry last shortened the cycle to three days from five. Canada, Mexico and Peru will also join the US in shortening their settlement cycles on September 5, while Japan has announced that it is also in the throes of moving to a two-day cycle.

Moving to a shorter cycle was finally prompted in part to harmonize the US with other global markets that have already made the jump. The European Union implemented its T+2 cycle in 2014, in an uneven manner, with some markets remaining for the time being on T+3, such as Spain, which did not move equities settlement to T+2 until 2015. This was still enough to prompt the US financial services industry to form a technical working group to look into moving to T+2 that same year. Headed by the Securities Industry and Financial Markets Association (Sifma) and the Investment Company Institute (ICI), the group gathered custodian banks and buy-side firms to figure out the steps to prepare the industry for a move of its own.

> "There have been discussions on the shortened settlement cycles. At one time, I think in 1999 or 2000, there were conversations about going to T+1. But in 2014, once the EU harmonized at T+2, it was just a matter of time before we followed. It was lightning speed for this industry—just about three years—for a project of this size."
> **Tom Price, Sifma**

Tom Price, managing director for operations and technology at Sifma, says discussions around T+1 had been around for a while but it was not until 2014 that plans went full steam ahead. The speed at which the industry worked toward T+2 is proof of its commitment, he says.

"There have been discussions on the shortened settlement cycles. At one time, I think in 1999 or 2000, there were conversations about going to T+1," Price says. "But in 2014, once the EU harmonized at T+2, it was just a matter of time before we followed. It was lightning speed for this industry—just about three years—for a project of this size."

Long Journey

Ever since the industry adopted T+3, participants have been talking about further reducing the settlement cycle. Carol Penhale, now managing director for professional services at vendor Broadridge Financial Solutions, remembers being part of an industry group in the late 1990s when she was still with Mackenzie Financial—now Mackenzie Investments—to discuss shorter settlement times, but many felt that it just was not a good moment to move to a more technically challenging process. "I sat on a committee back in 1999 and there was an effort to move to T+1 then. I remember saying that I'm not really worried about Y2K, but this T+1 thing scares the crap out of me," Penhale says. "The difficulty is that even a kindergarten student can recognize that if you're trying to do something in one day that used to take five days, it will be tough."

Penhale points out that after the 2008 financial crisis, the perception of just how much risk was in the system began to change, with the prevailing attitude being that this amount of risk should be reduced—including that in the settlement cycle. But at that point, every financial institution was more concerned about meeting new regulatory requirements than focusing all of their attention on one area of the post-trade lifecycle.

In the aftermath of the 2008 global financial crisis, the US government introduced a host of new rules around capital requirements and reporting that consumed much of banks' infrastructure budgets, notes Thomas Giacalone, managing director and head of operations, wealth management for the Americas at UBS, leaving little in the way of resources to tackle T+2.

"If you look across the US, there's a lot of interconnectivity between players, industry utilities and other participants, so sometimes making changes to it means we're not as nimble as some other newer or smaller markets," he says. "There have also been a lot of regulatory items over the last financial crisis that firms have had to deal with that consumed a large portion of their IT investments, which meant they haven't been delivering as much innovation. Given all of the regulatory projects prioritization, it just took time for the industry to get to this point."

Giacalone adds that because the US is moving to T+2 within three years, going to T+1 or even T+0 should be much faster.

Carol Penhale
Broadridge Financial Solutions

Costs

The costs associated with the move to T+2, including those related to critical systems upgrades, meant that the industry had to be convinced that the benefits of moving the cycle outweighed any expense. Pinar Kip, who leads global strategic operations at State Street, says the cost of going down to a one-day cycle is three times more than a two-day process, so the steps for lowering the settlement time even further could well face obstacles. "When the group sat down and looked at what it would take to move to a two-day cycle, we had to consider not only the project cost of making this change but also the technology adjustments with the risks and mitigation costs that come from that—and it is not small," she says. "To pull the trigger, the benefit of moving versus the risk of not moving had to end up balancing out. So in the spirit of not letting perfect get in the way of good, the group continues to have conversations on what the path will be."

Illustrating just how large the bill could be, the US Securities and Exchange Commission (SEC) estimated that moving to T+1 would cost around $1.77 billion today compared with $550 million for T+2, in a ruling on May 30, 2017, that paved the way for T+2 to begin in earnest. The SEC did not respond to requests for comments.

One benefit of the EU being the first mover in the switch to a T+2 cycle has been that the US is able to use lessons learned in that process to guide its own implementation. One such lesson was around the treatment of on-exchange and off-exchange transactions, which drove home the importance of seeking regulatory clarity. This means that there will be no option for certain transactions to remain at three days to settle. Another was to take a closer look at how a shorter cycle might affect derivative structures priced on underlying equities in a basket.

In the European Central Bank's (ECB's) paper, *Best Practices of T2S Markets' Migration to T+2*, the ECB states that it is important to have clarification when off-exchange or over-the-counter (OTC) transactions settle. It felt that without any clarity, OTC transactions would default to T+3 and cause confusion, advice the US T+2 working group has heeded.

Consensus Taking

Along with the Depository Trust and Clearing Corp. (DTCC), Sifma and the ICI began reaching out in 2014 to market participants to seek consensus that a program to move to a shorter settlement cycle was important. Most acknowledge that gathering industry-wide consensus was the hardest part of the journey, including Graeme McEvoy, managing director at Morgan Stanley. "I think the biggest challenge was making sure the industry was moving in the same direction at the same time," McEvoy says. "There are a lot of different constituents within the industry, and they all have to agree that T+2 is a good thing, and we're going to do it on a certain time and date."

The other important step to a shorter cycle lay in regulatory support. Sifma's Price says it was important to get the SEC to change the regulations surrounding settlement so that the entire industry had a ruling to follow. The SEC amended Rule 15c6-1—lowering the settlement cycle to two days or fewer—in around six months, something of a minor miracle in the often-glacial environment of regulatory change.

To mitigate the risk of potential settlement failures, testing has been undertaken to familiarize market participants with the shorter cycle. The DTCC set up 14 two-week testing runs beginning in February and lasting

until a few weeks before September 5. John Abel, vice president for product management, settlement and asset services for the DTCC, says the testing is entirely voluntary. "Our commitment was to build out an environment that will allow members to test whatever transaction they thought they needed to test," Abel says. "The industry testing group agreed that we wouldn't mandate testing. We're processing almost a million transactions per test cycle so we're getting very robust participation in the testing environment and I can report that there have been no systemic issues."

Abel says that the last few testing cycles have seen fewer transactions as the implementation date nears, possibly signaling market participants' growing confidence in their settlement processes.

September 5 was chosen specifically for the T+2 implementation date because it sits right after the Labor Day public holiday in the US, so securities-market volumes will not be as high as they might otherwise be in early September. The Thursday after is considered a double settlement day because it happens to be at the end of a three-day cycle for securities traded the Friday before the holiday. This means that the DTCC will settle both T+3 and T+2 trades. Nevertheless, the industry is confident that September 5 and the subsequent settlement day of September 7 will pass without much trouble. However, just in case, Sifma and the DTCC have set up a hotline that companies can reach in case of a potential break. "We'll have a command center that we will be monitoring. It will provide resources starting Friday night through the weekend and into Thursday the next week where members can get information and support," Price says.

John Abel
DTCC

With many custodian banks having experienced moving to a shorter cycle in other markets, it is mostly the smaller firms that are vulnerable to any potential issues. State Street's Kip says smaller firms may need to have additional people on hand who must work faster to ensure that all the processes are met within the shorter timeframe. Corporate actions will probably be difficult to navigate during the first few days of T+2, because as Morgan Stanley's McEvoy explains, discretion dates related to buying stocks and getting voting rights are built around settlement dates.

T+1 in the Near Future?

But now that the US capital markets are on the cusp of T+2, is an even shorter cycle next? Many in the industry say that T+1 discussions have already started, though it may be harder to move to one day from a two-day cycle. The technology transformation needed for a two-day cycle, McEvoy notes, was already a compromise between the three-day cycle and the more expensive systems overhaul required for one-day settlement. "To go from five to three days decades ago was a major lift; to go from three to two given the efficiencies that exist within the process today is a modest lift," McEvoy says. "But to go from three to one would require substantial changes in many adjacent markets, like the foreign-exchange (FX) market and the stock-loan markets, and there is a lot of other fundamental work that would need to happen."

Going even further down the rabbit hole may not just require technology and infrastructure upgrades, but also an overhaul of established processes. Right now, trades are processed in batches, usually kicking off at the end of the trading day, although a shorter timeframe might mean that some trades may need to be processed immediately.

Giacalone of UBS says the technology lift around T+2 mostly involved changing configurations—for example, there may be tables within a bank's system for calculating settlements that required updating, or codes where the dates needed to be changed. He adds that UBS also needed to adjust reports containing settlement language. These changes are relatively simple when compared to those that would be required for a shift to a T+1 environment.

"Moving to a shorter settlement cycle means a lot of things have to happen in a more real-time fashion," Giacalone says. "You need quicker sharing of information and real-time reconciliation. With T+2, the industry was ready to go because no fundamental processes had to change. The next step is to get more efficiencies with real-time reconciliation and interfaces."

In all likelihood, the industry will inevitably get to that point sooner or later. The SEC tasked its staff—along with help from the industry and other stakeholders—with submitting a report "no later than three years from the compliance date of Rule 15c6-1(a)."

The report will include the impact of T+2 on market participants, potential impacts of an even shorter settlement cycle, the identification of technological and operational improvements that can be used to move to T+1 or T+0, and cross-market impacts. And there may even come a day when trades settle almost immediately, according to McEvoy. "Eventually, I imagine you could get to the point where you even settle the trades before you know you've executed them," he says. W

SALIENT POINTS

- Industry consensus over the benefits of T+2 was the most important step in beginning the move to shorten the settlement cycle governing the US capital markets.
- The move to T+2 was driven by the need to follow other major markets into a shorter cycle.
- Technological and operational efficiencies were needed before the market could fully move to a shorter cycle.
- Moving to a T+1 settlement cycle is potentially three times more expensive than the move to T+2 and requires a major overhaul of both technology and mindset.
- The SEC wants an assessment of the industry's readiness to move to T+1 in three years' time.

'What about Mifid II?' I asked Christoph Boschan, Wiener Börse's CEO. 'What about it?' he smiled in response. Apparently Boschan is one of the few people in Europe with a clear understanding of what Mifid II is all about it. Besides being head of Austria's national exchange, he is also an experienced lawyer with a PhD in financial markets law and was heavily involved from a regulatory perspective in the creation of the original Mifid regulation. By Aggelos Andreou with photos by Brindusa Ioana Nastasa

In 1771, Maria Theresa,

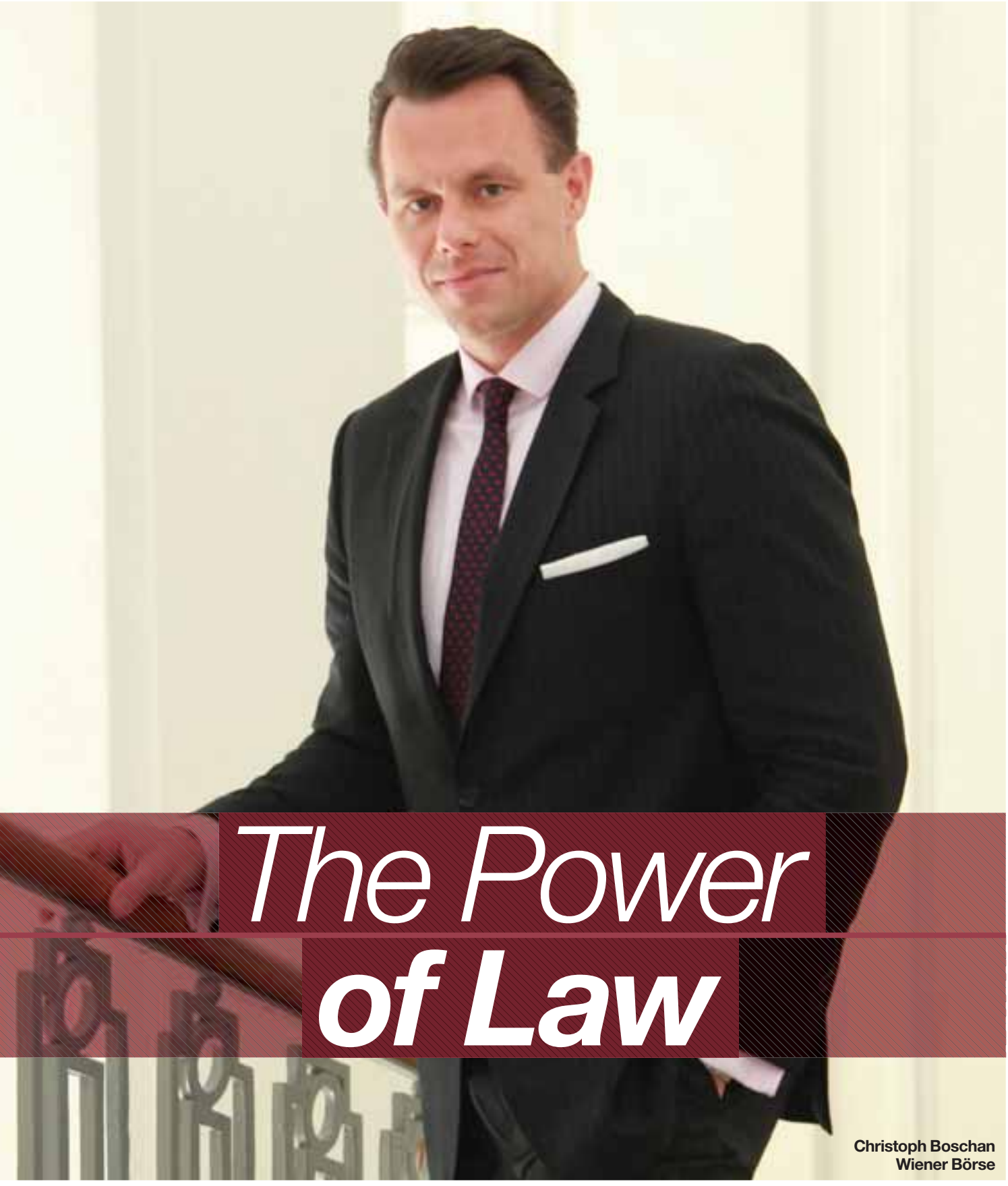
the Archduchess of Austria, established Europe's first financial marketplace in Vienna. Wiener Börse signalled the birth of European capitalism as we know it today; over 2,000 people would meet on the exchange floor daily to trade bonds and foreign currencies.

But after nearly two-and-a-half centuries in existence, the exchange felt that it needed to dust off its cobwebs, and it had the perfect man for the job: Christoph Boschan. In 2016, the 39-year-old former East Berliner took over the reins of the exchange and within a year, the Börse found itself eclipsing a number of its competitors in the mid-size arena. Its competitive advantage was, of course, Boschan himself.

Double Identity

Boschan's personal and professional background goes some way to explaining why Wiener Börse has been taking giant steps lately. He is a man always on the move between law and finance, a firm believer in the interconnection between local and global, and an innovation seeker surrounded by an abundance of legacy technologies.

But above all, he is a man born to be a market participant. The son of an industrial designer and a shop owner, Boschan's family had nothing to do with the financial markets, and yet he bought his first financial instrument at the age of 15. "I guess I was fascinated by the financial markets," he recalls. "It happened during the currency movement. I saw these exchange rates fluctuating and I thought it would make sense to buy a certain currency, then wait and back a certain tendency, and maybe I could make money out of it."



The Power of Law

Christoph Boschan
Wiener Börse

Boschan got his first job as a trader on the floor of the Berlin Stock Exchange and went on to study economics in recently unified Berlin in the late 90s. "That was a time when the German market was developing and the financial industry was in desperate need of exchange traders," he says.

It wasn't long before he realized that a full-time job and studies in economics aren't happy bedfellows and had to switch to law if he wanted to remain a trader. "No lawyer is ever going to admit this, but studying law at a German university gives you the freedom not to physically attend lectures, so it was rather convenient," Boschan says.

This oscillation between finance and law has characterized his entire career. "After that switch, I changed from market-making to market surveillance in the Berlin Exchange. I admit that this was difficult because I had to inspect my former colleagues," he says.

But when he was appointed managing director of the regulatory body of the Stuttgart Stock Exchange in 2010, he shifted to market operations within two years. This double identity proved to be beneficial at the time when the global financial system teetered on the brink of total collapse. "The day that Lehman Brothers died, the whole industry faced a tremendous regulatory tsunami, which was a great advantage for me," he says. "I was both an experienced trader and a fully qualified lawyer, and this was exactly the combination that was needed at that time to deal with the changing landscape in the financial sector."

Mifid II

Boschan's background also helped during his first days behind the wheel of Wiener Börse. Mifid II is a vast and complex piece of regulation and Boschan was critical of the way certain aspects of it were designed from a legal perspective. But being a man of law, he put the exchange on an implementation path as soon as he assumed the CEO role—he wanted to ensure that the exchange would fulfill all of its regulatory obligations. "The law is the law, and it should be respected," he says. "We are fully prepared and we are already on course for implementing the vast majority of the new regulations."

He admits, however, that the process was not without its challenges. "The directive is hundreds of pages long. This is a tsunami that's really hard to handle if you're a mid-sized exchange like us," he says.

For Boschan, the problem is not only the enormous financial burden Mifid II imposes on all European capital markets firms, but also the level of sophistication the technical standards have reached that makes it nearly impossible to keep up with the regulation. Plus, when help is needed, the central authorities are nowhere to be found.

"Most of the time when you address the European Securities and Markets Authority (Esma) or the European Commission, you don't receive a clear answer," he says. "Yes, there is an interaction organized by Esma to review the material and pay attention to comments, but it is a slow one and plenty of questions remain unanswered."

That's why he says the national authorities should play a more pivotal role in the directive's implementation. "What I would expect from a national authority is to act as a kind of interpreter," Boschan says. "I would like to see a more prominent and active role from the national regulators in terms of bridging European markets and helping to interpret the rules, and of course, standing up for the interests of the national markets."

Blame the OTCs

The original Mifid regulation, introduced in April 2004 and implemented in November 2007, is a regulation Boschan knows intimately. "I was heavily involved in the development of the first directive," he says. As managing director of Stuttgart's regulatory body, he participated in all the EC hearings. He says Mifid I was a much-needed regulatory framework that established the foundations of investor protection. What he doesn't understand, however, is why the

"The day that Lehman Brothers died, the whole industry faced a tremendous regulatory tsunami, which was a great advantage for me. I was both an experienced trader and a fully qualified lawyer, and this was exactly the combination that was needed at that time to deal with the changing landscape in the financial sector."

Commission had to apply Mifid II's regulatory requirements to exchanges. "It was not us, the regulated part of the market, that was responsible for increasing riskiness and intensifying the crisis," he says. "Exchanges remained operational and accessible during the course of the crisis, offering a haven for market infrastructure. I don't see functional flaws or any other room for improvement."

He says that this is one of the biggest ironies in the financial markets' history: Those entities that contributed the most to the market stability during times of uncertainty, have suffered the most from regulation. Instead, he says, the over-the-counter (OTC) space, "with those fancy, unregulated instruments," caused all the trouble. "The OTC systems just went off when financial institutions interrupted their services," he says. "The G20 summit in 2008 decided that volumes had to move back to regulated markets, but this was not reflected in Mifid II regulations. OTC volumes have increased over the past 10 years and remain at a very high level."

Boschan is also perplexed as to why Esma is introducing the OTC problem to a network of complicated platforms. He believes the solution should be straightforward. "Why doesn't the regulator just decide to bring the order flow on-exchange?" he wonders. "Why do we need alternative platforms? Just route it back to the exchanges, full stop."

He also has a clear message for the European Commission and his former colleagues at Esma, which he asked *Waters* to deliver verbatim: "Bring regulation to a halt for at least a couple of years. Let us all take some breathing space and consider the impact of regulations so far before coming up with any new ideas. That would be very helpful!"

The Old New

The second change that Boschan introduced as Wiener Börse's CEO was to reintroduce a more traditional way of doing business by way of communicating more frequently with clients. While he is no stranger to technology innovation—he was, after all, the mastermind behind the creation of Equiduct, the pan-European exchange operated by the Berlin Stock Exchange—he knows better than to be overly reliant on new technologies. He says it is clear that Wiener Börse is not going to be a technology leader. "We will diligently take care of how and when we should use it to lower our costs and to make some efficiency gains on our operational side," he says.

Boschan would rather address the exchange's clients' needs individually than fall into the "massive technology trap" of rolling out innovative solutions that might not be relevant to everyone and adding no value to the operational side of the exchange. He is also skeptical of the value offered by distributed-ledger technologies and artificial intelligence.

"I don't see blockchain, for example, as this socialist technology as it is usually portrayed these days," he says. "We went through the same discussion with Linux 20 years ago; everyone was saying that Microsoft won't be relevant anymore because we have free access to a system. But it turned out that it was not free because with all technologies, you need an infrastructure to maintain them, you need interfaces to be standardized, and you need service development."

He argues that instead, communication must be at the forefront of the exchange's advancements. "What is really disruptive is the interaction with the client," he says. "The direct client interface is something that is developing as a form of communication with the end-customer."

Curiously, Boschan has thrown his weight behind promoting a technology that has been around for more than a century: a radio station. "This has proven to be a rather modern way to communicate with investors," he smiles. "They can now visit our website and listen to insights provided by the executive management of our top domestic companies."

Knowing Vienna

Also on Boschan's agenda is his ongoing mission to correct the industry's perceptions about Wiener Börse. It is an arduous task, he says, since the Vienna market is perceived by many Austrian and European participants as being too expensive, too illiquid, and on the whole, irrelevant. "I usually approach these issues simply by looking at the numbers, and in this case, I found some really surprising facts," he says. "This exchange captures 75 percent of the overall trading volume of domestic shares. That's market dominance that no other national exchange can boast."

That didn't happen by coincidence, he says, but by very clear leadership on best-execution policies. "Wiener Börse has by far the best execution prices, the lowest spreads and the highest liquidity, which allows us to offer price quality," he adds.

Boschan's strategy was to establish a process whereby the firm evaluated its services and how it could further develop and upgrade them, and, secondly, how it might go about surfacing new business ideas. He also organized the exchange along similar principles to those of other financial services providers. "You have the side of the company that takes care of all the P&L-relevant issues, it communicates with the market and interacts with clients. And then you have the back office, which covers the usual things like IT production, internal revision and compliance, etc.," he explains. "We shifted the marketing responsibilities to me and the back office to the CIO and COO."

The final prong of Boschan's strategy was to ensure that Wiener Börse was in a position to offer international instruments to Austrian investors, who, up until 2016, were forced to trade on the Frankfurt or Stuttgart exchanges. "From day one we started pilot projects, such as the introduction of foreign stocks. It was apparent that the exchange was in desperate need of diversifying its revenue streams," he says. "We brought in the Nasdaq 100 and the DAX [indexes] and made them available for trading on our exchange, and we will definitely continue to expand on this."

The 30s

It is clear that Christoph Boschan will not rest until Wiener Börse is in the position he and his team have striven for—at the top of the European national exchange pecking order. And he aims to achieve all of the above while still in his 30s. "The board of directors knew my age when they hired me," he jokes. "But it wasn't an issue for the team or for me."

He says that being a good CEO is not about age but rather about experience and the ability to create something from the ground up. "I started out as a trader, I am a lawyer, I worked in market surveillance, I contributed to building a trading system, I worked on the regulatory side as well as operations, I was the managing director of the Stuttgart Stock Exchange, and I was even a member of the board of a listed financial services provider," he says. "I have been in this business for over 20 years, so I think I might even qualify as an oldie now." W

CHRISTOPH BOSCHAN
FUNDAMENTAL DATA

Name: Christoph Boschan

Title: CEO of Wiener Börse AG & CEESEG AG

Age: 39

Hometown: Berlin

Education: Law and economics

Hobbies/Interests: History, sports, painting

Greatest Business Success: Strategy development with Wiener Börse during 2016 and 2017

Lesson Learned: If you are not catching flak, you're not over the target!

The Balkanization of JavaScript

JavaScript has spawned many different frameworks and libraries—each with some cutting-edge functionality, and each with its own set of challenges. In this environment, CTOs must balance allowing freedom to experiment with new tools while making sure the sprawl doesn't become unmanageable. By Anthony Malakian

In the book *Soviet Communism: A New Civilization?* by Sidney and Beatrice Webb, there is a quote attributed to Bolshevik leader Vladimir Lenin: "It is true that liberty is precious—so precious that it must be rationed." Lenin's communist ideals certainly run counter to the ethos of the American Dream, which perhaps was best encapsulated back in 1775 by Virginian Patrick Henry: "Give me liberty, or give me death!"

A case can be made that too much freedom and too much choice can yield unfavorable results, but there's also an equally valid idea that freedom and choice breeds innovation and competition.

In the world of programming, the JavaScript (JS) movement—buoyed by the proliferation of cloud-based and software-as-a-service (SaaS)-delivered platforms—has provided greater flexibility, functionality, and to some extent, an ability to reduce costs. Designed by Brendan Eich back in 1995, it brings web pages to life, and, along with HTML and CSS, is a core component of web development.

JavaScript has also spawned a raft of frameworks and libraries that can be deployed throughout the technology stack, but which do not necessarily cooperate with one another. So, for processes like data binding, there is Angular 1 and Angular 2, which

isn't compatible with the original. There's also React, Backbone, Ember, Vue, Knockout and Polymer, among numerous others. Then, for building systems, choices include Grunt, Gulp, Branch or Broccoli, again, among numerous others. Keep on moving down the stack, and the options continue to spread.

In the "old days"—which, in this industry, is somewhere around the turn of the millennium—almost the entire stack would come from a single provider. If you were a Microsoft customer, chances are that you would use Windows, SQL Server, IIS Web Server, Visual Studio for Developers and a .NET framework. "It's not that everything worked magically well together, but you had standardization," says Dan Schleifer, co-founder and CEO of charting vendor ChartIQ. "In the new world, at each layer of the stack there are multiple options, each from different vendors or open-source communities, and opinions run very deep."

Dan Schleifer
ChartIQ

Too Many Cooks

This lack of standardization has created major challenges. One programmer, who has worked for several tier-one banks and financial services firms, laughed when asked about this: "Oh, you don't even know the half of it. There have been efforts to standardize the web and the way browsers work for 20 years. There are consortia—W3C—and working groups—TC39—and standards bodies; things are always changing. For a developer, it can be near insanity, not to mention that things may look or behave differently on all different devices and operating systems."

The head of technology at a large asset manager says that the open-source movement on Wall Street has only added to the problems. "The move to open-source has created a lot of packages that are available and the developers always want to use new, cool shit," he says. "Unfortunately, they don't always consider the longer-run, is-this-maintainable aspects of their decisions. So, you get each firm using a ton of different stuff for really no reason."

Sure, a CTO could crack down and implement prescriptive rules for developers, but that poses problems—for instance, it could limit experiments using innovative new tools, or it might create internal strife among personnel. "A lot of firms have started to take the 'code in whatever you want to' attitude, which I fundamentally disagree with—they are creating huge mountains of future problems by doing this," he says. "The thing holding folks back is that the developers are too powerful—the CTOs don't want to piss them off—and the frameworks are too easy to get, so it is hard to control the sprawl. Back when you had to pay for everything, you had a natural choke/control point to work with."

Mazy Dar, CEO of HTML5 containerization platform OpenFin, says that while this is a new environment,

Wall Street firms are benefitting in the long run. Flash is owned by Adobe, so what happens when it ends support for the platform, a development that has actually occurred? Sun Microsystems, and later, Oracle, owns Java, so what happens after an acquisition? Microsoft owns .NET—what happens when a firm is locked into one company and that company has a major outage?

Tools like HTML5 and JavaScript are not owned by a single vendor. This is also true of Python, Ruby and many others, but what makes JavaScript unique is that it runs natively in a web browser, while the others do not—yet. Additionally, HTML5 and JavaScript are—in one way or another—seeing major investment from Silicon Valley giants like Google, Apple, Amazon and Facebook, in addition to Microsoft, Oracle and Adobe. This helps to improve testing tools, create performance and security enhancements, and improve stability and scalability.

"For IT organizations that might have been used to getting everything from, say, Microsoft, this is new friction that they didn't previously have to deal with. So I don't want to minimize that this is a new challenge and for sure something that people are thinking about actively. But there's the cost and there's the benefit," Dar says. "The flipside to this is that with HTML5 you can build once and run everywhere. With the Microsoft stack, you were confined to the Microsoft platform. But in today's world, they want their app to run on iPhone, iPad, Android devices, Macs, PCs, and Linux's operating system. So the idea of building to a Microsoft-only world as you would have five to seven years ago, just doesn't make sense anymore."

So how can firms manage this newfound freedom that banks and asset managers have been handed thanks to the web and open-source tools? With freedom comes consequences. Managing that, and ensuring that things don't spiral out of control, is the art of democracy—or the downfall of an empire.

> "If I look at the investment required to deliver a new app with interesting new functionality, you're now starting to see a difference of multiples in terms of the effort required, which drives people to start looking at these new technologies. For me, everything else follows from that." **Shawn Samuel, LiquidityBook**

Evolutionary Splits

Originally, this article was meant to be a look at HTML5's evolution—something this magazine has chronicled over the last five years. But what became more interesting was the progression of web user interfaces (UIs), where HTML5 and JavaScript are used in unison, and evolutionary problems are related to both standardization and too much choice.

The proliferation of JS libraries, specifically inside capital markets firms and technology vendors servicing them, is largely thanks to Wall Street finally seeing the benefits that the open-source community brings to the development process, and in talent acquisition. While there is a lack of standardization, there's at least some coalescence around popular libraries. For example, one bank CTO notes that the jQuery library handles a lot of Document Object Model (DOM) control, and has become "a library that is considered a standard, base library," in the industry. Another library gaining traction is React.js, which is used to build user interfaces. It is sponsored by Facebook and is open-source, but that also means it is not maintained in the same way as Java or C#. Similarly, Angular is sponsored by Google and is open-source, and while it's widely used, CTOs find it frustrating because there are big changes between versions, which requires some recoding and testing. For example, the jump from Angular 1 to Angular 2 was virtually a complete rewrite. While that's fairly uncommon, it creates added confusion and frustration, and it hurt the Angular community for a little while. "It's definitely a wild, innovative, but challenging ecosystem," says a bank CTO. "I chose Backbone.js for my team, which now seems to be falling to the sidelines, but was neck-and-neck with Angular at one point, and refactoring our codebase would be difficult, so Backbone it is."

The CTO of a large buy-side shop says the firm is starting to standardize on React.js, but has tried a variety of JavaScript frameworks in the last few years. "The market is moving fast on this and it is uncomfortable for enterprises. We want a single, easy answer and it hasn't been that way for a long time," says the CTO, harking back to the days of buying a single platform and releasing it down the stack, for example, with Microsoft, Oracle or some other behemoth.

Different Strokes

When it comes to open-source libraries—or, for that matter, any third-party code—these standardization challenges are not unique to JS, notes Drew Shields, CTO of trading platform provider Trading Technologies (TT). "But what makes JS unique is its accessibility and platform-agnostic nature, which has resulted in a community more dedicated to open-source as a philosophy than any language before it," he says.

In April, Trading Technologies unveiled TT Desktop, which allows for 18 monitors to run in unison. Prior to the release, the SaaS-delivered trading platform was only available through a single-browser window. While most users found that setup to be acceptable, sophisticated users thought it was cumbersome. TT Desktop was created in partnership with OpenFin using HTML5 technology. Since it does not require a browser because it uses OpenFin's container technology, clients can better utilize multi-core processors and graphics cards, which allows traders to use over a dozen monitors.

It's a revolutionary product that even caught JS creator Brendan Eich's attention on Twitter, which led to OpenFin and TT giving him a demo. Shields says that regardless of languages, developers and engineers need to be aware of libraries used and, in general, shouldn't use a framework or library just because it's convenient. "At TT, we use a handful of open-source libraries, but [we] always ensure that we either fork the library's repository or include the actual source in our repository so we are always in control of what version is used and can treat it like it was our own code in terms of process," he says. "If a lightweight process like that is too onerous for some teams, then I'd argue there are other more pressing problems to address than the

Drew Shields, Trading Technologies

large number of easily accessed and integrated open-source libraries. At a minimum, they could invest in tools that can scan source code repositories to find what third-party code is used and report on its presence as well as a licensing model."

In the same vein, ChartIQ rolled out Finsemble, an HTML5 desktop application framework, in May. ChartIQ's Schleifer says Finsemble provides the "glue" that allows a firm to piece together its own trading terminal. Like the TT Desktop, the vendor has partnered with OpenFin. Finsemble is designed, in part, to help firms circumvent this standardization issue. While a Bloomberg terminal uses a hybrid of legacy, .NET, HTML5 and various JavaScript frameworks—including its own framework called Brisket—it all works seamlessly so that users doesn't know the difference. Try to build something similar on your own, and the user will likely know.

Banks have a melting pot of legacy apps, tools and HTML5 software built in different frameworks—if one component is built using Angular and another built using React, they won't play nicely together on the same page, Schleifer says. Finsemble is designed to allow banks to take this mess and create what, to the end-user, feels like a cohesive experience. "Yes, you want to solve the standardization problem, but realistically you've got a hodgepodge now," he says. "Users don't care if their pricing tool is .NET, their chat tool is Java, their CRM app is Angular, and their trade ticket is React—they want it to all play nicely together in workflows."

At its core, Finsemble provides window and workspace management, snapping and docking, component linking, event routing, sharing of storage and authentication, and data feed management, all on one platform.

Build a Strategy

Shawn Samuel, CTO of SaaS-based trading solutions provider LiquidityBook, says that to manage the sprawl of frameworks, componentization of products is necessary. Componentization allows vendors to swap out products multiple times. For example, 12 years ago when the LiquidityBook launched, it opted for a direct homegrown remote procedure call (RPC) mechanism for messaging. That was eventually swapped for a hub-and-spoke ecosystem. Today, the company uses RabbitMQ messaging. "We were able to do that with almost no cost and extremely quickly because that piece was well componentized; we abstracted that away from the core system," Samuel says.

Where it has run into trouble is that as a technology company it has had to hire talented developers. As a result, it has had people come in and build decent working solutions but they lacked cohesion. For example, one developer might build something using C++, while another might use C# because that's what the developer knows and is able to get it out fast. Inevitably, Samuel says, if you don't pick your spots carefully you end up having to rebuild for things like database access, access to your configuration system and your Redis cache, and building a lot of core code. Then, as soon as you

end up building the same concept in multiple places, you are unable to refactor—the process of changing a computer program's internal structure without modifying its external functional behavior or existing functionality—and you're unable to employ new technologies because you have to change three different things instead of one.

The LiquidityBook platform was built on Java infrastructure, but the stack built on top of that uses jQuery and Knockout. "What we've learned is that decoupling in order to allow experimentation is a great concept, but it's not as simple as that," Samuel says. "You need to think about, am I really employing a new tool not just because it's cool but in a place where I think I'm not going to pay a price for using it? Experimenting with new frameworks that sit on top of core-system components has worked very well for us."

New Blood

Samuel says this trend is a "pull-based, not push-based" evolution. As the consumer internet continues to offer new richness of experience, there is a different expectation level about user interfaces. Additionally, developers and—more importantly—institutions as a whole, are becoming more comfortable with open-source licensing.

"If I look at the investment required to deliver a new app with interesting new functionality, you're now starting to see a difference of multiples in terms of the effort required, which drives people to start looking at these new technologies," he says. "For me, everything else follows from that."

Any talk of programming languages will eventually lead to the hunt for talent. Every head of technology with at least a modest-sized staff has to balance bringing in new talent and tools while keeping the stalwarts happy and engaged.

> "With the Microsoft stack, you were confined to the Microsoft platform. But in today's world, they want their app to run on iPhone, iPad, Android devices, Macs, PCs, and Linux's operating system. So the idea of building to a Microsoft-only world as you would have five to seven years ago, just doesn't make sense anymore." **Mazy Dar, OpenFin**

Developers are driven by using the latest technology and that is how a CTO can allow them to exercise their creativity—but it's hard to control. These JavaScript libraries enable developers to build engaging, flexible, and often beautiful UIs, which can help drive productivity, better display complicated data—see D3.js—and provide value to the business. But they can also be a distraction in their own right.

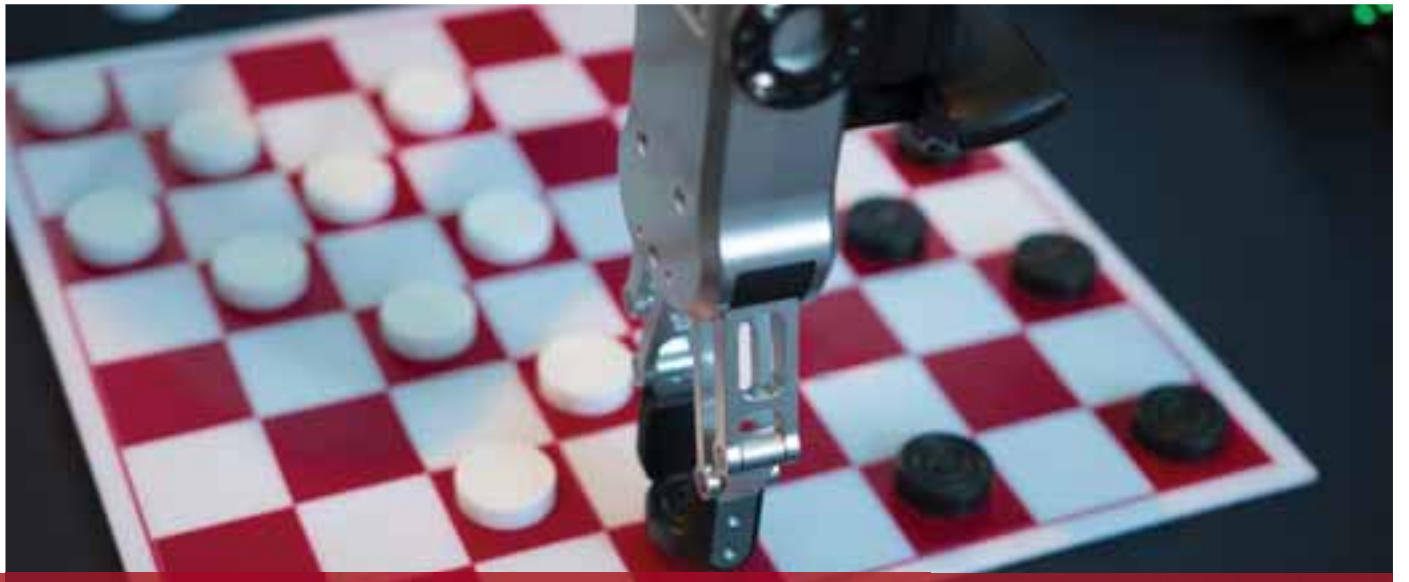
While the stock market is built on capitalist ideals and the belief that free markets are better for the populace as a whole, banks, asset managers and even vendors need to buy into at least part of Lenin's idea—liberty is great, but there must be limits. How strict should they be? Developers would probably like a libertarian utopia; CEOs and board members would probably prefer Soviet Russia in their IT departments. That's a balance that heads of technology must strike.

And that's just from an overarching development perspective. What about internal juggling? How do you mesh a developer of 25 years who might still be comfortable with .NET and Java and who helped to build those legacy systems with a 25-year-old developer who wants to play with the slickest JS framework, and who will stubbornly expect a rationale for why they can't use the most recent language?

Finally, if Leninist philosophy is too much of a stretch when it comes to the balancing act that modern CTOs have to perform, then perhaps Shakespeare might offer some insight: Heavy is the head that wears the crown. W

SALIENT POINTS

- In the past, firms would typically rely on a single vendor to provide almost the entire technology stack. As web development took off and as Wall Street firms have become more comfortable with open-source solutions, it has led to developers looking to experiment with a growing array of JavaScript frameworks.
- JavaScript and HTML5 have become ubiquitous for web development among financial services firms. They offer excellent flexibility and innovative tools, but their open nature also makes it hard for CTOs to contain their usage throughout the IT department.
- JavaScript's various frameworks have also become useful tools in the hiring process, as young developers want to work with the most cutting-edge frameworks available.



Machine Learning in the Capital Markets: An Inside Look

While there's a lot of talk about machine-learning technology across the capital markets, much of it is overblown. There's also no question that these tools are set to become increasingly prevalent over the coming years. Anthony Malakian takes stock of where the industry is currently by looking at actual implementations, rather than theoretical discussions.

Desmond Lun spent much of his academic career focused on computational biology. In 2006, after earning his PhD in electrical engineering and computer science from MIT, he became interested in understanding how applying techniques for analyzing big data problems in biology could predict financial market outcomes. Lun began trading, trying out ideas from his own work in computational biology and developing new methods geared toward finance. It took six years to develop the core of the platform that would eventually power his hedge fund, Taaffeite Capital Management, an Australia-based outfit that Lun, who also teaches plant biology and computer science at Rutgers University, created alongside Howard Siow.

Pronounced "tah-fight," the hedge fund is named after a precious gemstone discovered in 1945 by Richard Taaffe. Taaffeite the investment manager was launched in 2014. It was built on a core artificial intelligence (AI) platform that uses Bayesian networks and deep learning. While that might sound complex, Lun insists that these are "very, very general techniques." What matters, he says, comes down to "how you apply them and how you make them work for a specific problem that really determines if it works or not."

Taaffeite sucks in large amounts of widely available data—such as historical prices and exchange-traded instrument volumes—and feeds it into its learning algorithms. The ways in which the algorithms learn, based on specific biological computations, make Taaffeite's strategy proprietary. They use structured datasets that the system learns from and make a very specific prediction, based on which

"We came out with a very, very large, winning bet. [Brexit] was responsible for about two-thirds of our gains, but even if you take that day out, we still would have had a very, very good month and it's really because of all the uncertainty around that decision—it created a lot of opportunities for anomalous pricing to occur." Demond Lun, Taaffeite Capital Management

the program decides how to act and how to place trades. "And there's no human intervention," Lun explains.

He says it's important that the system can eke out a small edge at a time. He likens it to using loaded dice at a craps table, knowing the grift is on while the others at the table are none the wiser.

Huge Gains

Take, for example, Brexit. While some got clobbered by the shocking result of the referendum that saw the British people vote to leave the European Union, Taaffeite's lower-leveraged fund returned 20 percent in June and about 30 percent for its higher-leveraged funds. On June 24, the day after the Brexit vote, the hedge fund made about two-thirds of those June gains in a single day, Lun says.

"Our system doesn't know anything about external events—it's reacting on historical prices and volumes. What it was seeing, though, was prices starting to move in an anomalous way. If you looked at European equities compared to equities in other markets, they were being bid up in the run-up to that referendum on the expectation that it would go the other way, and obviously it did not and we made very large gains out of that," he says.

"I think what the system was picking up on was a very, very good asymmetric bet where if Brexit had not happened, we probably would have made small losses or no losses at all," he continues. "But as it happened, we came out with a very, very large, winning bet. That was responsible for about two-thirds of our gains, but even if you take that day out, we still would have had a very, very good month and it's really because of all the uncertainty around that decision—it created a lot of opportunities for anomalous pricing to occur."

A Leap

There's a lot of hype surrounding the machine-learning space. Vendors throw around the term "machine learning" like they throw around the term "industry leader" when describing their organization or technology/services. This feature makes an impartial assessment of machine learning's proliferation in the capital markets using specific examples.

Artificial intelligence—which combines everything from machine learning to robotics, deep learning, natural-language processing and virtual reality—is the most intriguing technological development facing the industry today. For all the talk of blockchain, the hype is already withering on the vine, in many ways. But AI implementations—and spending—are tangible.

According to consultancy Preqin, 40 percent of hedge funds launched in 2016 were considered systematic and favored computer models and algorithms over human analysts, though that's a loose analysis as it doesn't necessarily mean that machines are making all the investment decisions, as is the case with Taaffeite. Consultancy Opimas estimates that this year, financial firms will spend over $1.5 billion on AI-related technologies—including machine learning—and that will jump 75 percent to $2.8 billion in 2021. And the MIT Technology Review website stated that machine learning, specifically, has created a "tremendous resurgence" in overall AI endeavors, across all disciplines and sectors, and predicted that financial data was the next frontier to be conquered.

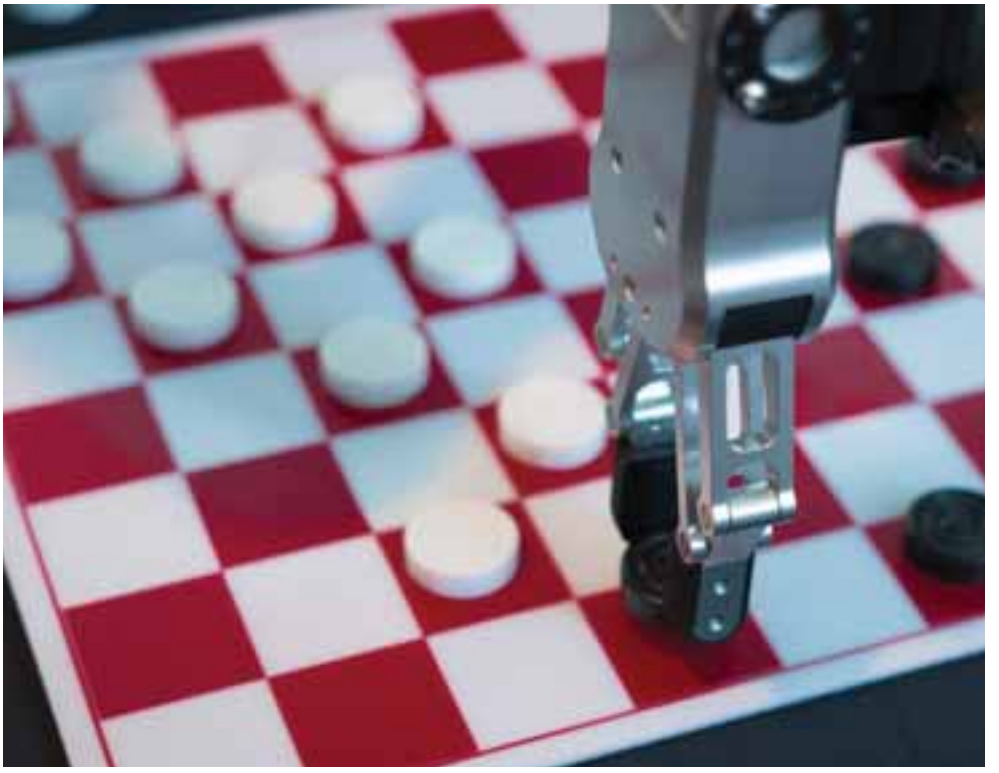
Machine learning has been around since the 1950s; the techniques being used aren't necessarily creating this rapid advancement in the industry. It has more to do with a combination of outside effects, according to Michael Kollo, deputy global head of research for AXA Rosenberg. First, there's the issue of big data—there is a ton of data available that can be analyzed and broken down, all attainable on the cheap. And alternative datasets are becoming increasingly valuable for trading houses.

Additionally, the ability to cheaply store that information has also vastly improved, in large part thanks to the advancement of public cloud providers like Amazon, Google, Microsoft and IBM. But perhaps most importantly, computing power has increased exponentially over the last decade, so gaining insights from these machines no longer takes months of computational analysis. "One thing that's not going away is that whether we call it machine learning, AI, deep learning, or whatever else, processing power is only going one way. The allure of finding patterns because you can examine every permutation of every possible pattern within your dataset is only going to get greater," Kollo says.

A Snapshot

To benchmark machine learning's progress in the capital markets, here are just a few of the more interesting use-cases that we've seen during 2017:

- In June, IBM launched its Watson Financial Services Solutions unit, which addresses everything from anti-money laundering/know-your-customer (AML/KYC) needs to fraud monitoring and surveillance. IBM, being one of the leaders in AI advancement with solutions already in place in the healthcare and security sectors, is now taking aim at finance's regtech space. "What we're doing with cognitive technology is automating how we assist that person with that secondary-alert triage. We can provide them with an augmented view of that alert," Alistair Rennie, general manager of IBM Watson financial services solutions, told *Waters* at the time of the launch. "We've trained the system to look for that alert and look at the surrounding data—what did we do in comparable cases and is there outside data that can help fill in a hole?—and then based on the pattern, it can provide a dashboard and a proposed recommendation to the person who is going to make that ultimate decision. So it lays out its evidence and its hypothesis and then the person responsible for making that determination can complete the triage of the alert."
- Nasdaq has been wading into the AI waters for a while now. In July, the exchange operator decided to make a bigger splash by acquiring London-based regtech firm Sybenetix, which uses machine learning to predict people's behavior in order to flag suspicious activities. "What we've come to learn by working more closely with the buy side is that there is a growing market demand [for these platforms]," Valerie Bannert-Thurner, senior vice president and head of risk and surveillance technology solutions at Nasdaq, told *Waters* after the acquisition. "We see a lot of different buy-side firms across the board realizing that strong compliance is a key competitive advantage and a differentiator."
- At a conference hosted by *Waters*' sibling publication, *Risk*, in July, BlackRock's Stefano Pasquali, who heads up the firm's liquidity research unit, told the audience that the firm is using machine-learning techniques to better calculate the cost of liquidating fund positions in the case of redemptions. Right now, BlackRock is in the process of feeding internal trade data into its market liquidity model. Depending on the insights gained, it will tweak the system from there. "Liquidity is multi-dimensional and is impacted by so many features. It is highly non-linear. So this is a typical use-case for neural networks," he said, adding that BlackRock will also use machine learning to assess the probability of large net-flows out of its funds.



Alistair Rennie
IBM

- High-frequency trading (HFT) shop Hull Investments uses machine-learning algorithms to power its market-timing strategy, where it adjusts the equity exposure depending on return forecasts, where the strategy is anywhere from 150 percent long to 50 percent short. "I think the biggest thing is we've had so many different techniques—everything from neural networks to random forests—that the biggest benefit recently has been in the combination of models, or an ensemble of models," Blair Hull, founder of Hull Investments, told *Waters* in an earlier interview. "So you don't just have one model—you have multiple models that you use. That's the biggest advancement that's come in recent years."
- The US Securities and Exchange Commission (SEC) began using machine learning to augment its risk assessment processes back in 2008. The regulator has moved on to modeling and using it to measure the probability of words

within and across documents to find unique topics and insights, and to create alerts. Both topic modeling and text analysis are now used widely in the agency to point to possible anomalous transactions, noted Scott Bauguess, SEC acting director for the division of economic and risk analysis, and acting chief economist, during his keynote speech at the CyberRisk North America event in June. "The underlying science is remarkable and this data-driven approach makes it easier to apply to SEC procedures," Bauguess said. "Regulators can use artificial intelligence and machine learning to understand behavior, and we have been integrating them into the risk programs of the SEC."

- London-based hedge fund group Man GLG appointed William Ferreira to the newly created role of head of machine learning, where he will be responsible for developing the firm's machine-learning capabilities, providing its portfolio managers with tools and techniques through which to support their analysis and decision-making processes. "We believe that machine-learning techniques present an opportunity for discretionary investment managers, providing them with analytical tools to complement, and further enhance, their decision-making processes," noted Teun Johnston, CEO of Man GLG, in a statement. "We are continually seeking to develop our offering for our clients and, as the amount of data available continues to expand, these techniques can supplement existing rigorous quantitative and qualitative analysis."

Kim Fournais
Saxo Bank

- Saxo Bank has been working with machine-learning techniques for several years now. In a previous interview with *Waters*, Saxo's CEO, Kim Fournais, said that the bank recently started working on a component that will help it to better personalize users' trading and investment experiences using machine learning. "It will understand your behavior, your interests, what kind of news you are interested in, what kind of instruments you have traded, and what kind of risk profile you have," he said.
- Trumid, an all-to-all electronic trading platform for corporate bonds, uses machine learning to power its Likelihood-to-Trade (LTS) score, developed by its Trumid Labs unit. Its proprietarily built machine-learning model incorporates real-time information entered into the dark pool by users, and analyzes the past performance of similar bonds. The list uses that information to provide a view into possible trading opportunities. Trumid asks its users to "follow" either subsets of bonds or individual bonds. That list can be thousands of bonds long, depending on the user. LTS' machine-learning model—which serves as a dynamic list-sorting tool—then takes that user "follow" list and creates a list of bonds that have the highest probability to trade at that moment. "It decreases the amount of time they need to hunt around for what they can get done on the Trumid market center platform and it potentially increases the probability that they get a trade done," Jason Quinn, who leads new product design for Trumid, told *Waters* in a previous interview.

Enough Fiction

At its core, machine learning is both understandably defined and complex. It's easy to understand its basic premise—a computer/algorithm learns without being explicitly programmed to execute on a specific function. What's not so clear, however, is how those algos develop their own functions. This creates misconceptions and unrealistic expectations.

Take Google, for example. Its Google Brain deep-learning research unit taught two neural networks—named Alice and Bob—how to encrypt and send messages to one another that a third neural network, Eve, could not understand. Poor Eve. There were as many negative articles written about this experiment as positive. Then there is Facebook's chatbot neural networks that created a language to more efficiently communicate with one another. There were rampant (false) reports that the engineers had to kill the project for fear of a computer takeover.

The imagination runs wild with associations of the evil Skynet computer network from *The Terminator* when you hear these stories, but right now it is facile to invoke the name of a fictional company from an Arnold Schwarzenegger film. In finance, machine learning is still on the ground floor compared to what Google and Facebook are working on, and they're still just scratching the surface of the technology's potential. Rest assured, however, that sooner or later machine learning will be used for most everything—in small parts and large—from the front office to the back office. W

SALIENT POINTS

- Machine learning usage has expanded for a variety of reasons that don't necessarily have much to do with advancements in machine-learning techniques as a discipline. Rather, it is evolving because of advancements in other fields.
- The increased abundance of data sources—combined with its relative cheapness and its many varieties—has made machine learning more useful because it's more efficient at sifting through massive datasets. Also, the ability to cheaply store that information has vastly improved.
- Perhaps, most importantly, computing power has increased exponentially over the last decade, so gaining insights from these machines no longer takes months of computational analysis.

John Brazier

The Existentialist Dread of Robotics

The increased development and use of robotics to manage various business processes across the capital markets may herald a new era of automation, but the lingering dread of being replaced by machines still lingers, says John.

Whenever the word robot is used it is intrinsically linked to outlandish scenes taken from a straight-to-DVD science fiction movie. Even now, I can't help but hear the theme music from *Terminator 2* in my head whenever I read something about robots.

The reality of robotics, however, is still rooted in the mundane. Anyone who watched the recent viral video of a robot attempting, and comedically failing, in the simple task of stacking a small box on a shelf has little need to fear any kind of robotic uprising in the near future.

And yet, whenever discussions around the use of robots for automation purposes arise, so does the deep-rooted fear that humans will soon become redundant in favor of machines. For its part, the mainstream media also plays a role here, using the terms artificial intelligence (AI) and robotics interchangeably.

But let's be very clear on one thing here: Robots and AI are not the same thing, although the two can be, and often are, deployed together. While AI clearly holds massive potential to transform the way in which financial firms, and indeed every other market, operates, unchecked development in this arena does come with a certain element of danger. Robotics, on the other hand, are simpler tools that are limited by user-set boundaries and are unable to learn anything new beyond those parameters without external input.

Should we fear the machines?
For more information and readers' feedback please join the discussion at **waterstechnology.com/buy-side-technology**

Business Case

For capital markets institutions there should, by now, be a very clear business case for the adoption of robots or robotic process automation (RPA). Middle- and back-office systems that have long been based on human, manual processes are no longer sustainable, particularly when profit margins are being bolstered primarily through the reduction of operating costs.

> **Surveillance is another area where interest in robotic or AI-led technologies is growing, particularly for regulators.**

Robotic software tools can also be implemented in a similar fashion to application program interfaces (API) that allow previously siloed legacy systems, which may be too vital or expensive to replace, to communicate with each other. Surveillance is another area where interest in robotic or AI-led technologies is growing, particularly for regulators to assess possible market abuse.

For those banks that are currently eyeing a move away from London in the run-up to the UK's departure from the European Union, the option to implement simple robotic tools in the middle or back office at a new site seems like as good an opportunity as any. Staff may push back on the idea, although such an initiative does offer the chance to introduce change for the better and educate staff on the benefits the technology can bring while utilizing their skills in other more effective ways.

Fears Persist

But existentialist fears that human jobs, and in some cases people in general, will be lost to such machines persists. While it is inevitable that with the advancements in AI there will be causalities (jobs, not human lives), this is still some way off yet. No bank is going to hand over control of its technology stack, either in whole or in part, to a machine, because there's just too much margin for error, not to mention the possibility of having to explain such a decision to a regulator in the event that a machine committed a regulatory breach.

While writing this month's feature on the use of RPA for reconciliations (*see page 12*), I found a number of research papers from various consultancies extolling the virtues and myriad possibilities robotic technology can provide financial institutions. However, none of these papers made mention of the adjustments required to the human workforce that implementation of robotics would almost certainly require.

One of the sources I spoke to outright rejected the notion that large swathes of banking staff will lose their jobs to RPA, instead insisting that the nature of their jobs would change, with higher skill levels, a better understanding of technology across the enterprise, and greater acceptance of younger staff appointments more adept with new technology as possible, positive results. Perhaps it is time to let go of the fear and embrace the possibilities that robotics can bring to the capital markets? And as with so much else in life, education is the first step toward understanding. W

Whisper It Quietly, but Regulation May Have Benefits

Nobody likes having to comply with a new set of rules, but for the buy side, James argues, regulation is prompting a long-overdue stint of soul-searching.

Is regulation a good thing?
For more information and readers' feedback please join the discussion
waterstechnology.com/sell-side-technology

This month, I've been revisiting a topic that I thought was long dead—the investment book of record. I remember when this was all the rage a few years ago, but now blockchain seems to have given it a new lease on life. But in talking to my old contacts, preparing the ground for a longer piece which should be out in the next couple of months, at least one thing has become clear: While books of record and these projects are all well and good, the real driver behind much of these massive projects has been regulation. Not one specific rule, although many of my sources did cite some, but more the fact that it is beginning to touch the buy side, and it's forcing an evolution.

There is a strange tendency to talk about the buy side in terms that seem infantile when it comes to technology. People, and I'm lumping those whose job it is to sell technology to the buy side in with others here, often talk about buy-side technology as if it's quaint and outdated—and to be fair, it often is—or use phrases such as "growing up."

But to rely on that metaphor is misleading. One enterprise architect I spoke to said that it wasn't that his firm didn't understand complex data schema or best-in-breed software, but that there was no real need to get involved with that until the regulators came knocking.

This is also true of forward-thinking, smaller firms. One hedge fund CEO I spoke to said one of the reasons he hired a technology director and undertook a wide-scale revamp of the fund's entire technology base—a task of some significance given its client mix of institutional, retail and high-net-worth individuals—was in no small part because it gave it access to more advanced compliance functionality.

Many tech people on the buy side I speak to say that while compliance can be a pain in the neck to negotiate, it's actually given them credentials within the firm and access to greater resources.

> **While compliance can be a pain to negotiate, it's actually given them credentials within the firm and access to greater resources.**

More than that, some say in private, that it's actually beneficial. One compliance chief at a boutique firm cited the Volcker Rule, saying that it's actually helped his job as now prop trading is more or less banned, and he doesn't have to unpick a tangle of trades each day to work out what was executed for clients and what wasn't.

Likewise, others point to the Market Abuse Regulation and the revised Markets in Financial Instruments Directive as examples of where, in some areas—and certainly not all—improvements are actually being made to the market and to their environment. They can now argue for more structured data architecture within their firms because compliance with the rules practically demands it, for instance.

Expressing the idea that regulation is helpful is not the most popular opinion, of course, and most of these anecdotes were made as asides to conversations or during drinks after conferences. But there is a general sense among forward-thinking technologists on the buy side that this might be a once-in-a-generation opportunity to really evolve buy-side technology to the next phase of its existence.

Grasping Opportunities

There is also a general feeling among the people I spoke to that the successful firms will be the ones that grasp this opportunity with both hands, rather than sitting back and waiting for it to happen to them. The hedge fund CEO I spoke with, for instance, took the opportunity while he was upgrading the firm's technology to shift it all to the cloud, which helped to enable a geographic expansion with a new office in the northeast. Likewise, the enterprise architect said that while he was engaging the investment book of record and related topics, the firm has put governance structures in place that have remained to date, and are reaping the benefits of that—even if the original project they were put in place to support has stalled.

Some regulation is onerous, badly written, poorly thought out and, of course, harms more than it helps. But the cumulative effect on the buy side, in forcing it to move into the modern era—and whisper this—might not necessarily be a bad thing. W

Emilia David

Looking to the Future of Settlement

As the US moves to T+2, talk of moving to an even shorter cycle is starting to gain a head of steam. But Emilia asks whether it is feasible, or even necessary, to move to T+0.

When the US announced that it would move to a two-day settlement cycle, or T+2, there was great relief, and no small sense of achievement—it has, after all, taken two decades to even get the project off the ground. But after shortening the settlement cycle from three days to two, there is already an ongoing review ordered by the Securities and Exchange Commission (SEC) to determine how quickly the market might be able to move to an even shorter cycle of T+1 or even T+0.

The financial services industry wants to reduce as much risk as possible, and the settlement of trades being set so far from execution day definitely introduces significant risk. Once this column is published, the US will already be in its two-day settlement cycle, although the big dream has always been to reduce settlement times even further. But is moving to T+0 actually feasible? Can trades actually settle the moment they are executed, or shortly thereafter?

As I point out in my feature on page 16 that looks at the T+2 journey, shortening the settlement cycle to two days was a compromise between the more expensive move to T+1 and staying at T+3. Making the move to T+2 did not require massive changes in technology infrastructures, and settlement processes remained largely the same.

Since there is much talk about blockchain, many see that technology as a harbinger for T+1 and even T+0 settlement. After all, if all counterparties have the same information related to a trade, the need to wait for a day or two to reconcile all the data is eliminated. Settlement is more than just the reconciliation of data, but that tends to be a huge chunk of it.

The potential T+0 move has its critics, however. Joshua Satten, a director of Sapient's fintech practice, says T+0 might just be too difficult to maintain. "It's hard to manage T+0 because regulators don't run 24/7, so they can't monitor the process," Satten says.

> There's a good chance that in a few years' time, there won't even be a gap between trading and settlement.

"Settlement can be managed within at least a day, but real time is a lot more difficult than people think."

He adds that real-time settlement sounds good in theory, but T+1 is the most realistic option, as processes have not caught up yet with the promise of technology. For him, blockchain is not the savior of settlement—it's a way to enhance information sharing to make settlement faster and more efficient, but not necessarily bring it to instantaneous clearing. For now, market participants are playing it safe when it comes to talk about moving to T+1 and are not making any big announcements around blockchain's potential for clearing. And rightly so, as the technology is still being refined. Maybe when the use-cases for blockchain and other distributed-ledger technologies are thrashed out, we will see where it can provide the best solutions for something like settlement.

Is T+1 or T+0 possible?
For more information and readers' feedback please join the discussion at **waterstechnology.com/buy-side-technology**

Reluctance

There is a general reluctance in the industry when it comes to talking about when the US will move to T+1, even though many of the people I have spoken to admitted they have thought about the prospect of further reducing the settlement cycle. But it did take 20 years to get from T+3 to T+2, so no one wants to get their hopes up. There are also particularly thorny issues that would need to be worked out should the cycle shorten even further, which have little to do with settlement—how, for instance, would securities-lending work in a T+1 or same-day settlement environment?

That was one of the facets of the T+2 move that intrigued me most. It took 20 years to get consensus to move to T+2, but just three years from the inception of the technical working group to implementation. That speed of change is unprecedented and all it took was for the industry to come together and acknowledge that the US needed to fall in line with the global community—settlement in Europe switched to T+2 several years earlier.

With the pace of technological change, it's important to note that there's greater confidence now that it won't take another 20 years for the industry to go through another change. There's a good chance that in a few years' time, there won't even be a gap between trading and settlement, similar to what's already happening with CLS and its same-day settlement of certain currency pairs—assuming the creases can be properly ironed out. W

The Painful Truth About Morgan Stanley's Innovation Lab

This summer, Morgan Stanley founded a new innovation lab for startups that demonstrate racial diversity in their organizational structure. Aggelos says this reveals how outdated the industry's mentality is, even among self-proclaimed 'disruptive' companies.

Can fintech boost diversity?
For more information and readers' feedback please join the discussion
waterstechnology.com/sell-side-technology

Oh, the irony. It took an initiative by one of the largest corporations in finance to put inclusion and diversity in fintech into perspective and highlight the extent of conservatism in the startup scene and how opportunities are still open primarily to the privileged few.

Morgan Stanley, by way of its Multicultural Innovation Lab, is specifically interested in fintech startups with multicultural senior management teams and C-level executives. Firms led by people belonging to minority groups will have the chance to join the Innovation Lab in New York and work on their disruptive ideas and projects.

Of course, this lab is also the perfect opportunity for the bank to deepen its connection with the startup scene and drip-feed innovation into its corporate blood by assessing and possibly adopting the new technologies it incubates. On top of all of that, the selected startups will be given $200,000 each to help set their ideas in motion.

We live a time of Donald Trump, Brexit, and mostly closed European doors to civil war survivors, so this initiative was enthusiastically greeted by those who never tire of stating the obvious: that inclusion and diversity—in terms of race, gender, culture and sexual orientation—in business helps build equal societies, and can also become the catalyst for a firm's operational and financial growth and success.

But before we celebrate, let's take a step back and think for a minute. Why would a multi-billion dollar global corporation take this initiative? For image and brand-building purposes? Probably. For political reasons? Possibly. Or maybe it found a gap in the startup scene and it stepped in to fill it? But if that gap is racial diversity, then we have a problem. A serious problem.

The tech sector is supposed to be one of the most progressive industries in the world. You simply cannot think out of the box and build innovative solutions with your mind stuck in the 19th century. That's one aspect of tech-savvy people I have always admired—their progressiveness, open-mindedness, creativity, and sense of duty to change the way things work.

To my surprise (and disappointment), I recently came to the realization that in fintech, things are not as disruptive as I originally thought. Not tech-wise—I still trust the industry's big ideas in that respect—but in terms of culture and mindset, where I believe fintech startups are miles away from being truly innovative. Multiple studies have shown that the rusty archetype of a homogenous corporate-style management team remains the preferred choice of the organizational structure of most of these firms.

Counting CEOs

For example, an internal paper by the Center for Financial Services Innovation (CFSi) published in January this year revealed that diversity numbers among startups created shockwaves throughout the industry. The paper, written by CFSi's Asad Ramzanali and Josh Sledge, states—among other things—that there are black and Latino CEOs in fewer than 1 percent of venture-backed fintech startups in the US. Also, the overall percentage of represented minorities (African Americans, Latinos, Asians and Native Americans) in the startup workforce did not exceed 30 percent.

In the UK, a 2015 study on diversity conducted by startup accelerator Wayna said that in its yearly review, it was twice as likely to find a C-level executive from an ethnic minority in a UK fintech startup compared to the US. Still, the numbers remain undeniably and overwhelmingly low.

> You simply cannot think out of the box and build innovative solutions with your mind stuck in the 19th century.

It goes without saying that people from different backgrounds introduce unique perspectives, and that blend can mean the difference between a disruptive solution and one that is simply new. Morgan Stanley has played a card that (apparently) nobody else has played before, which should be seen as something of a stain on fintech startups. It's something that I believe they need to ruminate on and start acting the way they are supposed to: like a real, disruptive and innovative community. W

Human Capital

Former NLX Chief Takes Interim CEO Job at UK Fintech Body

Charlotte Crosswell, a former Nasdaq executive, has taken on a new challenge—leading the trade association for the UK's fintech industry, at a time when the nascent sector is being challenged by political and financial developments. Crosswell took on the role of CEO of Innovate Finance at the end of August after the departure of Lawrence Wintermeyer, who had held the post since May 2015. She will lead the group, established in 2014 to advocate for UK fintech firms, on an interim basis until a successor for Wintermeyer can be found.

Crosswell is no stranger to the fintech space, as a non-executive director of The City UK, another lobby group associated with the UK's financial sector, and as the former CEO of Nasdaq NLX. NLX was the US exchange operator's ill-fated attempt to launch a derivatives exchange based in London to challenge rivals for a share of the lucrative European derivatives market. Launched at a time when other US exchange operators were making inroads into the European market—including the Intercontinental Exchange with its 2012 acquisition of NYSE Euronext, and the Chicago Mercantile Exchange Group, with its 2014 launch of CME Europe—NLX proved initially popular but failed to gain lasting traction among market participants. Nasdaq announced that it would close the venue on January 31, 2017, and it has since been wound down, according to a Nasdaq spokesperson.

Charlotte Crosswell

Patrick Strobel

Liquidnet Hires European Tech Chief from Deutsche Bank

Liquidnet has announced that Patrick Strobel will join the firm as its head of technology for Europe, the Middle East and Africa, a new post designed to boost the firm's high-touch offerings in the region.

Strobel joins Liquidnet from Deutsche Bank, where he was most recently CTO for the corporate banking and securities finance business, and common data sourcing. Prior to that, he held a string of senior technology roles as a director during his 11-year career at the German lender, including those as head of application services for profit and loss and independent price verification, data architect for equities technology, and global head of equity trading analytics. He began his career as a consultant and programmer at Valtech, before moving on to a three-year stint at JPMorgan.

Strobel will report into Bob Garrett, head of technology, based in New York. At Liquidnet, he will be responsible for enhancing the firm's European technical infrastructure, particularly for its Virtual High Touch offering, ahead of the implementation of the revised Markets in Financial Instruments Directive (Mifid II) on January 3, 2018.

Strobel tells *Waters* that Europe is a particularly challenging area for two reasons: first, because fragmentation of the liquidity landscape is so intense, and second, because competition from fintech firms in the trading technology area is fierce. "There comes a time when you really need to focus on the regional level," Strobel says. "If you look at the significant nuances in the algorithmic level, the market microstructure is fundamentally different in a European context versus the US; having a technical presence and strength within the region was fundamental."

AWS Taps Colt's Hutchinson to Drive Financial Cloud Migrations

Amazon Web Services has hired longtime financial networks account management and management executive Julie Hutchinson as senior partner manager for financial services, responsible for driving software vendors and their clients to migrate content and applications from legacy infrastructure to AWS' cloud solutions.

Hutchinson was most recently head of capital markets solutions for North America at UK-based network provider Colt, where she was previously US director, having joined the company in 2014 from cloud solutions provider Unitas Global, where she was regional director. Before that,

she founded and was president of datacenter consultancy Colocation Concierge, prior to which she was strategic account director at Telx, a strategic account manager at Equinix, senior account manager at Level 3 Communications, and global account manager at Savvis.

CME Hires Honoré to Lead Data Product Management

CME Group has hired Adam Honoré as executive director and head of product management for data services, leading a team responsible for delivering new data products for both real-time and historical offerings. Those include the management of both data administration and distribution on behalf of third parties leveraging CME Group's technology and expertise. The team is also responsible for the product management of the platforms that support the delivery and administration of those products.

Prior to joining CME, Honoré was CEO of financial markets and technology advisory firm MarketsTech. Before that, he was a managing director at Nasdaq OMX where he worked on the exchange's industry-specific cloud project FinQloud, which was later sold to Amazon Web Services. Honoré has also held roles at research consultancy Aite Group and software development company Comprehensive Software Systems.

Based in Chicago, Honoré reports to Craig Mohan, managing director of market technology and data services. His appointment is part of a broader initiative by the exchange to leverage derived data as a revenue stream. "It definitely represents an important revenue stream to us and our team is well on its way in responding to and executing on the growing demand for our data IP," said CME president Bryan Durkin during the exchange's second quarter results.

Adam Honoré

Opus Adds Finance and Tech Chiefs to Roster

Compliance and risk management solutions provider Opus Global has appointed two new executives as the firm seeks to increase its global presence. Glenn Renzulli is the firm's new chief financial officer, while Michael Angle has been promoted to chief technology officer. Renzulli joins Opus from software-as-a-service (SaaS) based talent management firm PeopleAdmin where he was CFO. Prior to PeopleAdmin, he was CFO at TeacherMatch and started in the finance industry at General Electric where he was a finance integration leader for several of the firm's acquisitions.

Angle is the former president and co-founder of Alacra, a know-your-customer and reference data solutions provider that was bought by Opus in 2015. He remained in that position after the acquisition. With his new role as CTO, Angle will lead innovation to enhance current products and develop new solutions, the company says.

Opus CEO Manny Conti says the appointments of Renzulli and Angle are strategic to support further international growth. The company currently has users in 195 countries. "The appointments of Glenn and Mike further enhance the strong capabilities of our executive team and will help us drive continued global growth and innovation," Conti said.

Natixis Appoints New Taiwan BizDev Head

Natixis Global Asset Management has named Tony Huang general manager and head of institutional business development for Taiwan. Huang is responsible for institutional, wholesale and retail business initiatives for the firm's operations in Taiwan, along with leading new institutional business development initiatives.

He joins Natixis from Neuberger Berman, where he was the firm's head of business development. Prior to that, he spent five years at Aberdeen Asset Management as a senior manager for business development. Huang reports to Kinji Kato, executive managing director and head of Japan.

In a statement, Kato said Taiwan is an important market for the firm as it builds its regional platform for big

AxiomSL Hires Wormald to Lead APAC Sales

AxiomSL, a regulatory reporting, data and risk management solutions provider, has hired David Wormald to oversee the vendor's sales and business development activities. Wormald will be based in Hong Kong and will report to Asia-Pacific CEO Peter Tierney, who is based in Singapore.

Wormald brings to AxiomSL 25 years of industry experience, most recently as Asia-Pacific regional sales director for enterprise content and capabilities at the financial and risk division of Thomson Reuters. Previously, he was regional sales manager at NYSE Technologies and Asia-Pacific head of business development at Broadridge in Hong Kong.

David Wormald


Tony Huang

pension funds, corporate clients as well as sub-advisory business.

The company has offices in Tokyo, Singapore, Hong Kong, Seoul, Taipei and Beijing.

US Senate Confirms J. Christopher Giancarlo as CFTC Chair

Attorney J. Christopher Giancarlo is now the permanent chairman of the US Commodity Futures Trading Commission (CFTC), after a unanimous vote by the US Senate. Giancarlo had been acting chair of the CFTC since January this year.

"I am humbled by the bipartisan support in the Senate," Giancarlo said in a statement. "As I have stated before, during my time as a Commissioner, I have witnessed first-hand the enduring commitment of members of the US Senate to our common purpose of serving the American people and the agricultural producers upon which we all rely. I stand ready to fulfill the CFTC's mission to foster open, transparent, competitive and financially sound markets, in a way that best fosters broad-based economic growth and American prosperity."

The Senate also unanimously confirmed Brian D. Quintenz and Rostin Behnam as Commissioners. Quintenz is the founder, managing principal and chief investment officer of Saeculum Capital Management, while Behnam is senior counsel for the Senate Committee on Agriculture, Nutrition and Forestry.

DBS Appoints Latiff as New Institutional Digital Head

Singapore-based DBS, the Development Bank of Singapore, has appointed Raof Latiff as head of digital for its institutional banking business. Latiff takes on responsibility for furthering the bank's digital suite of products and services for large corporate customers. Prior to joining DBS, Latiff was regional head of product management, global liquidity and cash management for Asia at HSBC, and has over 20 years' experience with Citi and JPMorgan in cash management and treasury roles.

Latiff will report to John Laurens, DBS' head of global transaction services, and Ng Peng Khim, DBS' head of technology and digital innovation for its institutional banking group.

"Digital corporate banking is at the core of our transaction banking strategy and the way in which we will further strengthen our institutional banking franchise," said Laurens in a statement. "The development of digital propositions is rapidly reshaping the manner in which we work with customers. We aim to create value across our clients' commercial and financial operations and support their transformational change objectives."


J. Christopher Giancarlo

Ex-Soros' Kerstein and Innovative Network Solutions Announce Alliance

Stamford, Conn.-based IT support and services provider Innovative Network Solutions Corp. has partnered with veteran data and trading floor technology engineer Steven Kerstein to help the company roll out an outsourced market data management service, dubbed Market Data Administration. The service is aimed at firms with fewer than 1,000 data consumers who use Thomson Reuters' DACS entitlements system for usage reporting and invoice reconciliation, but either don't want to manage the burden of dealing with entitlements issues themselves, or don't have sufficient expertise to know where data is being used and whether they are compliant with their data licenses.

The Market Data Administration service will help firms control exchange fees by profiling usage patterns, ensuring accurate entitlements, identifying any under-reporting to avoid fines, and netting the same data across multiple applications. It will also provide exchange reporting and introduces audit trails to ensure that any data acquisitions go through the proper approval and authorization processes. The core MDA service offers an initial DACS "best practice" assessment, and provides new user setup and entitlement changes, authorization workflows, production of DAD declaration reports, plus 24/7 helpdesk and secure VPN access. A premium MDA service provides the same features as the core service plus data notification assessments, product change notification reviews, "map collects" processing, and usage and audit reports. W

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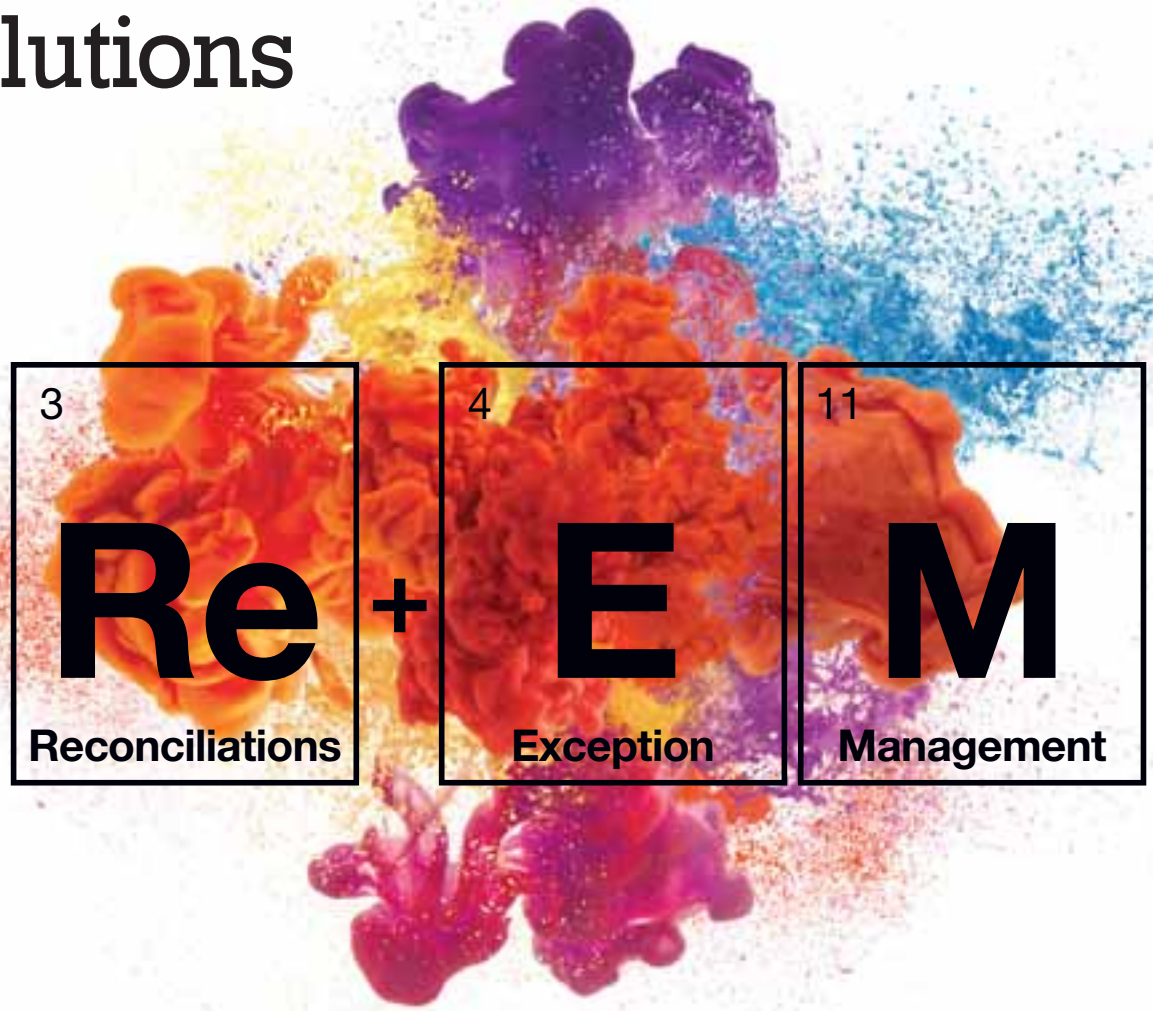
Combining the elements for highly responsive solutions



At SmartStream we believe that starting with a solid foundation of elements is vital when creating new operating models. As a result, it's never been easier for firms to access highly responsive, tailored solutions which can be deployed at speed and with immediate impact.

Our innovative technology delivers an unparalleled range of reconciliation and exception management options to monitor and manage all transaction types; lowering cost, reducing risk and creating more agile operations.

So, whether you are looking to replace legacy systems, build an internal processing utility, utilise the cloud or outsource your entire operation, partnering with SmartStream is the perfect chemistry.