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THE WAY FORWARD

NO ONE CAN PREDICT WHAT TOMORROW WILL HOLD, BUT FOR THIS ISSUE WE GATHER SOME OF THE INDUSTRY'S BRIGHTEST MINDS TO GET THEIR THOUGHTS ON HOW FINANCIAL TECHNOLOGY WILL BE FOREVER CHANGED AS A RESULT OF THE CORONAVIRUS.

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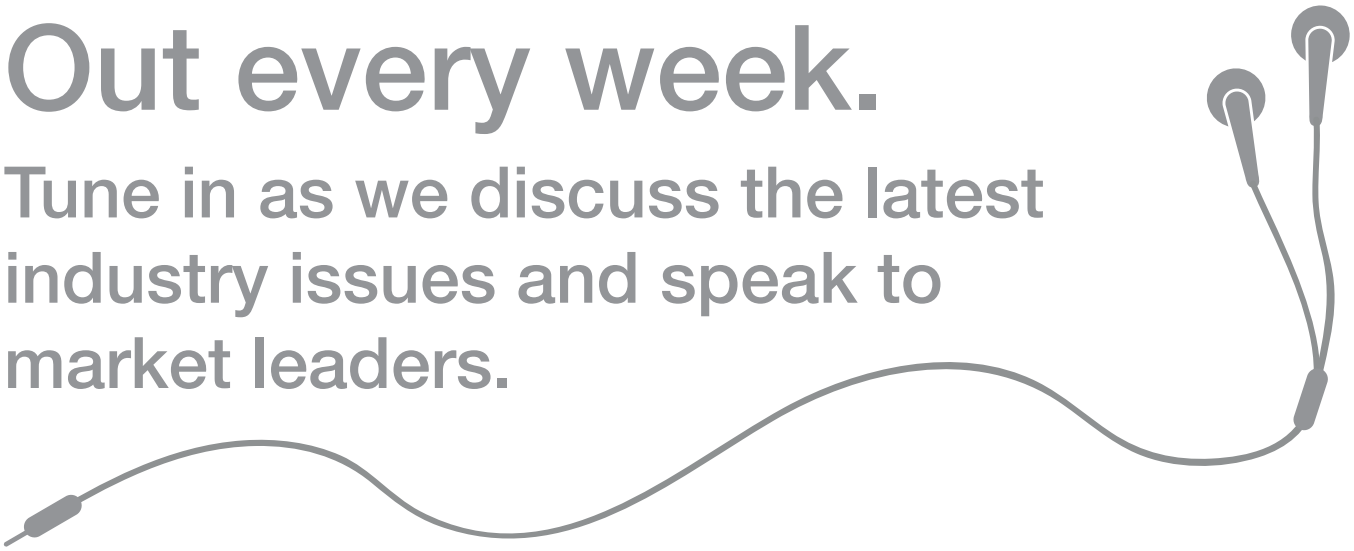

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A Snapshot in Time

After a four-month hiatus, we're back to printing a hard copy of *WatersTechnology*. When we last met, I wrote about the old axiom that "smooth seas do not make for skillful sailors." Well, we've had some rough seas. … How are you faring so fair?

Over the coming months—and likely years—we will continue to write about how capital markets firms are responding to the coronavirus pandemic, so this issue is not the be-all and end-all of our pandemic coverage. Rather, consider it a snapshot in time, as the stories in this magazine show how companies tried to withstand Covid-19's withering assault on humans, governments, institutions and economies through the rocky first months. The battle, of course, rages on, but as this issue will show, tech companies have already come away with a deluge of lessons about how to brace for the future.

In the pages ahead, you will read about how UBS and Tradition switched to virtual desktops to help workers adjust (*see page 4*), and how HSBC secured a cargo plane to transport 600 laptops more than 500 miles from Prune to Bangalore, India (*see page 22*). There is an examination of surveillance tech and how those tools have had to adapt to a trading world that works remotely (*see page 10*). Max Bowie spoke with more than a half-dozen people to see how banks will handle their costly office space in the future (*see page 18*). Reb Natale looks at how the coronavirus has shined a light on Cobol and the long-overdue need for banks to finally break free from the programming language (*see page 26*). And there are stories about how alternative data is proving crucial during the lockdown (*see pages 8, 14 and 28*).

That's just a taste of what's in this issue, but one thing that comes across in many of these stories is cautious optimism. Technologists work in the field of innovation and one thing that the pandemic has laid bare is the need for innovative solutions to problems that were once unthinkable. In the beginning, there were duct-tape fixes, but as I wrote four months ago, technology will either be the saving grace for capital markets firms, or their lack of investment in technology will be brought to light—and clients will take notice. wt

Anthony Malakian
Editor-in-Chief

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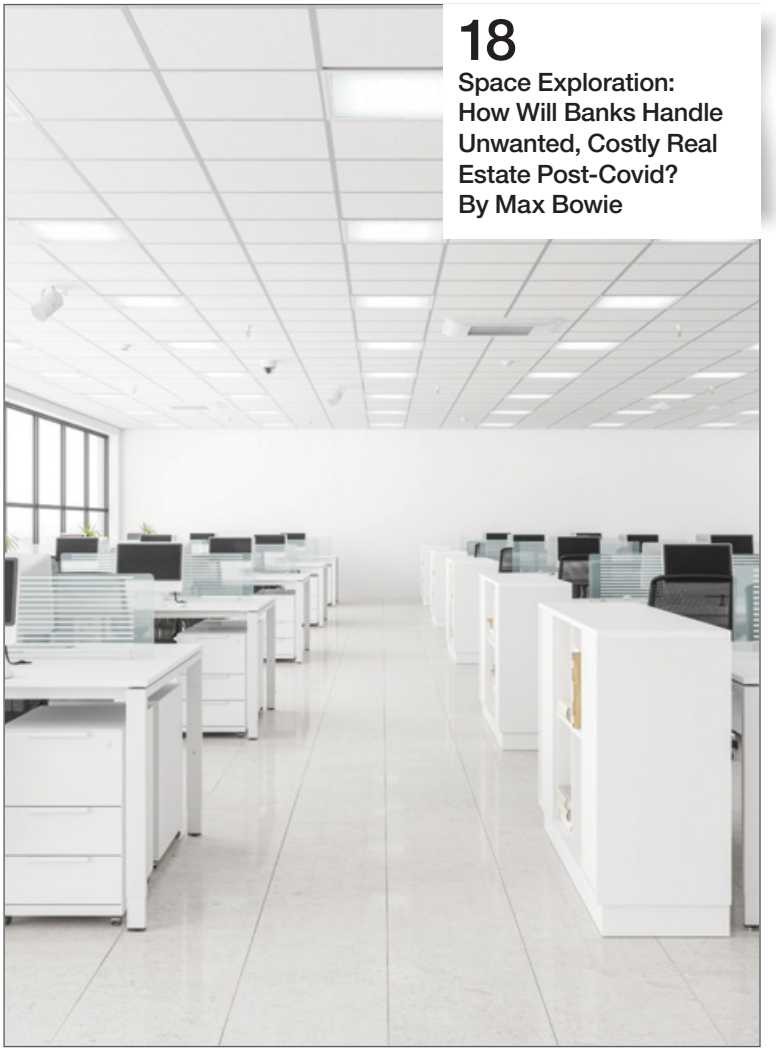

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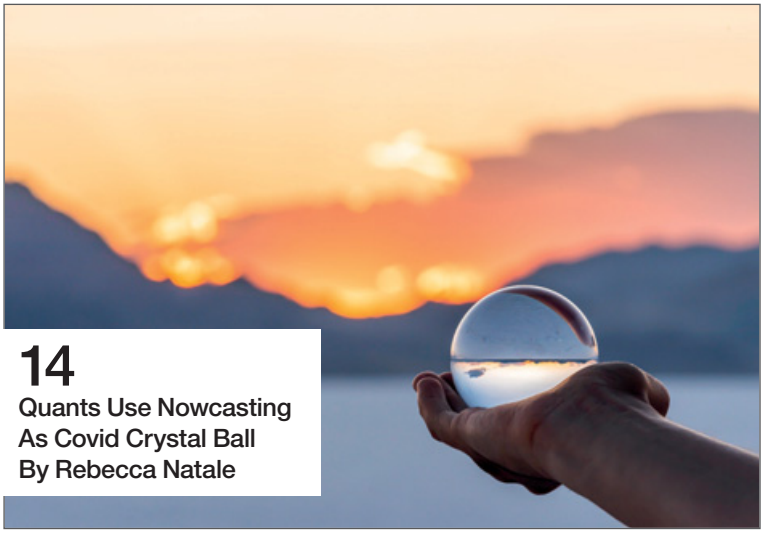

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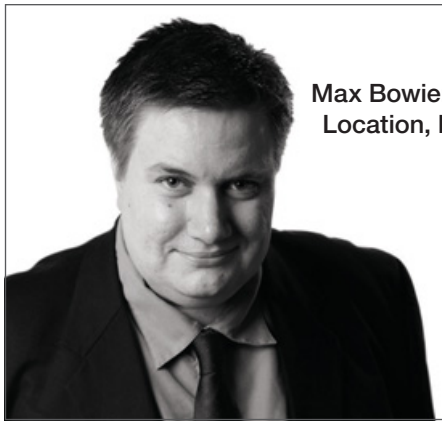

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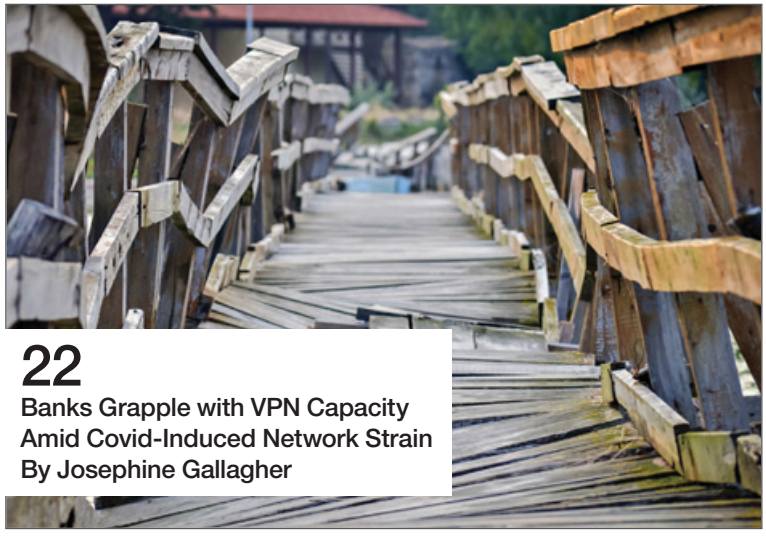


UBS: How Virtual Desktops Keep Workers Plugged In During Pandemic

The Swiss bank's A3 system offers a blueprint for remote working as the industry looks to life beyond coronavirus. By Jo Wright

In the 1980s, Italian drinks brand Martini promoted itself with the slogan: "Any time, any place, anywhere." Banking giant UBS is channeling a similar spirit for its remote working setup.

The system, dubbed A3—"anytime, anywhere, and any device"—has been put to the test during the Covid-19 lockdowns that have confined banking employees throughout the world to their homes since March.

A3 is a virtual desktop infrastructure, or VDI. It aims to give remote users the same access and functionality they would have if they were in the office—a home away from home, so to speak. Mike Dargan, head of group technology at UBS, believes that in this regard, it has succeeded.

"This morning I went into the office, and now I am back home, and it feels no different," he says.

Running a remote office environment for a large financial institution brings risks, though. Home working increases what experts call the "attack surface" for cyber criminals to exploit. The effect is magnified when such a high proportion of staff are exiled from the office and scattered among thousands of locations across the globe. The confusion of the pandemic is also fertile ground for phishing attacks and attempted hacks.

Luckily for UBS, the bank had already begun to introduce A3 in 2016, which meant the system was already embedded and tested before the pandemic struck.

With VDI, individual apps are hosted in the cloud or in a central server, rather than loaded on laptops or workstations. It's a more elaborate setup than a virtual private network (VPN), where users tunnel into a corporate network from outside.

A3 users log in to a remote desktop via a home device such as an iPad or laptop, running an ordinary browser like Chrome. The interface is customized for each individual: Employees working in operations, for example, see a different screen from traders.

To deliver its virtual desktop, the system requires an extra layer of technology. A3 runs Microsoft's Remote Desktop Services across a server provided by Citrix, one of the largest VDI providers.

Critics of VDI say the setup requires a hefty initial outlay on new hardware and servers. UBS spends 10% of its revenues on IT every year, in line with other large banking groups such as JP Morgan and Bank of America. But Dargan argues the system saves the bank money in the long run.

How? Since many corporate VPNs are typically built to support 20% to 30% of staff working remotely at any given time, some firms have had to allow access to their VPN on a rotational basis to avoid overwhelming the system during the pandemic.

UBS's A3 system is not limited in this way. At the height of the lockdown, the bank had 95% of its 90,000 staff working remotely across more than 50 countries. Even now, at peak working hours, some 60,000 staff are logged in simultaneously to the A3 environment. High staff productivity goes some way to ensuring the bank sees a return on its IT investment.

The bank also claims to save money by being able to patch the system remotely. If UBS were operating in a hard laptop environment, with users

tunneling into the corporate network via VPN, Dargan's team would have to fix each device separately. Now, it can just patch the database.

"We have a golden image, if you like, that exists in the datacenter. We just patch that, and everything is sorted [out]," Dargan says.

Going Mobile

The transition to A3 took place at the same time that UBS moved into its new offices in the City of London in 2016, and started doing away with fixed seating and workstations. The bank introduced thin clients—computers that run from a central server instead of a local hard drive—and equipped mobile staff with laptops. At the time, few rival banks had made this shift, with Citigroup's Manhattan office a notable exception.

For firms that don't use VDI or a similar kind of virtual solution, the pandemic has forced them to figure out how to very swiftly ship—or fly—laptops to staff. HSBC, for example, previously told *WatersTechnology* that it's considering providing virtual desktop capabilities to staff.

Early in the lockdown, financial firms along the Street scrambled to get their traders outfitted so that they could work from home effectively, as volatility triggered a spike in trading volumes. UBS itself saw 300% more activity than normal in March, Dargan says. For many firms, it wasn't always easy.

With A3, traders get special treatment. Their VDIs are hosted on a super-server called A3 Dedicated. "This is a dedicated blade or server in the datacenter with higher processing power," Dargan says.

Home-working traders also have two 34-inch screens and a thin client. To complete the array, UBS provides a "network wrap device." This is "a remote access protocol and a voice turret that interfaces into the system through the datacenter. So it's effectively what you would see on the trading floor: the turret, the screens, and so on."

> "If you have people working on the hardware, for example the mainframe, they need to be on-site. But it's a small number of people who need to be in the office, as we have virtualized our support functions." **Mike Dargan, UBS**

Mike Dargan
UBS

He says UBS is researching a virtual product offering with multiple screens for traders, but that is "still in the lab."

In another nod to user-friendliness, Skype and Microsoft Teams are fully integrated into the VDI setup. UBS says bank staff make around 3 million Skype calls per week, and the bank continually tracks the quality of calls. If a user is experiencing echo, the system spots it and alerts the user to mute themselves or change device. UBS engineers are also trying to boost the quality of video calls by synchronizing audio transmission with the image if they're mismatched.

In development are tools that will help diagnose issues with hardware or the user's home Wi-Fi, Dargan says.

Eagle Eye

With great virtualization comes great responsibility. A system like A3 needs constant monitoring and, here, UBS has a 24/7, follow-the-sun approach. The bank has tech operations centers in three cities—Nashville, Tenn.; Zurich; and Pune, India—that perform resilience monitoring and handle ongoing problems.

While some IT workers have to be on-site, most of the monitoring and maintenance is done remotely. "If you have people working on the hardware, for example the mainframe, they need to be on-site. But it's a small number of people who need to be in the office, as we have virtualized our support functions," Dargan says.

Hand in hand with a rise in home working comes an increase in the range of cyber risks that the bank is exposed to. In response, UBS has stepped up its monitoring of incoming emails, scanning for potential phishing attacks. Analysts report that phishing attempts are growing as scammers look to exploit the panic and uncertainty around the pandemic, though UBS has not noticed a significant increase in such attacks.

Phishing can range from marketing emails offering half-off on new office chairs, targeted at employees with sore backs who found themselves suddenly working at the kitchen table, through to messages purporting to contain new information about the coronavirus from seemingly reputable health authorities.

"We measured that in two ways. Firstly, we looked at emails or messages that were specifically related to Covid-19 and to working from home," Dargan says. He is wary of giving too much detail on the second element of monitoring for confidentiality reasons, but says the bank uses a layered security approach to detect and block attacks in conjunction with monitoring the underlying IP address of emails that come in.

"We look almost in real time at the origin of the email and the IP addresses related to it, and the subdomain of that IP address. So you can see a partial history of where the email comes from. That needs to be done in real time because we get tons of emails coming through," he says.

In common with many other firms, UBS runs exercises throughout the year to create awareness among employees of cyber security. This includes sending fake emails to staff to check responses.

As firms emerge, blinking into the light, after the months-long lockdown, Dargan predicts workers will want to stay home more than they used to. "Even if I look at it through my own lens, if I have only virtual meetings, that benefit of being in the office is small. I think there is a subset of the workforce that may want to continue to work from home partially or for good; we haven't yet got a defined view on this," he says. wt

Broker Tradition Makes the Shift to Virtual Desktops

The company is considering a full move to virtual-working solutions after investing in remote access for brokers and other staff during the Covid-19 pandemic. By Jo Wright

Interdealer broker Compagnie Financière Tradition (CFT) is considering moving to a fully virtual-desktop environment, after making a big investment in remote working technology during the Covid-19 pandemic.

In March and April, CFT had to get all staff working remotely with as little disruption as possible to productivity, while also experiencing increased volumes on some of its platforms. The company shipped equipment to some 600 people, and built a login so remote workers could access their applications via the web.

"I reviewed the costs, and found we spent the equivalent of two-and-a-half years of work in a month. Everyone was on it, including me, building laptops and PCs and anything else we needed to work remotely. It was intense," Yann L'Huillier, CFT group chief information officer, tells *WatersTechnology*.

L'Huillier says that access to software is a significant part of any business continuity plan (BCP), and CFT worked hard to make sure all its brokers and other staff could access what they needed in a short time. Financial firms still operate largely on what he calls "heavy desktops": each user has a PC installed with the applications they need. If you step away from your PC, you can no longer access the apps.

During the early days of the pandemic-induced lockdown, however, the company invested in desktop virtualization software from Citrix. A Citrix server is installed and virtualization tools allow CFT to deliver centrally-hosted apps and data to the desktops of staff even though they are not in the office. The applications are still installed on a PC in the office, but a worker can access what they need remotely through an ordinary browser.

> "Slowly but surely, we are going to move to having PCs in datacenters, so that if we want to reboot them, we don't need to have someone basically pushing a button on the PC."
> **Yann L'Huillier, Compagnie Financière Tradition**

Today, as part of the company's business continuity plan, all the apps CFT deploys to which brokers and traders need access must be via the web, L'Huillier says, even once workers are back in the office.

He adds that CFT will probably move away from this type of access in the future, and go fully virtualized.

"Today, for example, we have a PC under each desk. Slowly, but surely, we are going to move to having PCs in datacenters, so that if we want to reboot them, we don't need to have someone basically pushing a button on the PC, or the PC could be knocked out by someone," he says.

One drawback of the current system is that an IT staff member still has to be in the office to reboot PCs that crash, and sort out other kinds of interruptions to remote workers' connections to their PCs. "We had issues

one evening when we lost power on a number of PCs and we thought we had a network outage or something. It happened that it was the cleaning staff who knocked down a power supply. It happens," L'Huillier says.

CFT is not alone in turning to virtual desktop infrastructure (VDI) amid the lockdowns that forced workers all over the world to stay home. Citrix is a major player in this space, but other companies like Cisco Systems, IBM, Amazon WorkSpaces, and Red Hat also offer VDI. Some of these companies posted increased earnings in the first quarter of this year, following a pandemic-fueled surge in interest in this technology.

Pandemic Plan

When the lockdown orders came from officials and it was clear that its brokers were going to be working from home for a while, CFT had two key concerns, L'Huillier says. Firstly, as an intermediary in over-the-counter markets, it had to figure out how to ensure that brokers could still connect to traders. CFT operates fully electronic platforms in markets like foreign exchange; hybrid platforms—which are a combination of voice and electronic price contribution—for swaps, bonds and derivatives; as well as auction and matching platforms. The Switzerland-based company also operates Tradition broker and TraditionSEF in the US.

"We had to figure out how to move from an office setup where brokers have big dealer-boards, with 20 banks on the phone at once and easy access to their screens and analytics, to a remote set-up, while maintaining communication and ensuring that when we find the best price, the trader is not going to trade with someone else because of a lack of communication," L'Huillier says.

Secondly, all this had to be done while the broker was adhering to its usual regulatory and compliance stipulations.

> "The financial industry used to spend tens of millions to come up with BCPs that could never be triggered because none of the use cases planned for actually happened. We spent a significant amount of money in March, but it was a good investment. We put 600 people to work, and within a month, we had a BCP that will serve us for the foreseeable future."
> **Yann L'Huillier, Compagnie Financière Tradition**

"These concerns were heightened given the time restraints: We needed to have 600 people working from home, with the same level of productivity, in the space of a month and a half," L'Huillier says.

At the same time, the company saw unusual volumes on some of its platforms, though L'Huillier says he can't give more details. He says, however, that demand on voice platforms increased.

"Where you have a lot of orders, a lot of volatility, a lot of depth in the market, then the electronic market is the market of choice. In a situation where people are dispersed across different areas, and the market is different—the volume is there, but it's difficult to have good price discovery on the over-the-counter market [to understand] where the price is, where it should be, where can I trade—voice trading becomes the favored option," he says. "In March and April, voice brokerage increased purely because of the unique circumstances of this particular pandemic. In a different BCP situation, the electronic market would be much more prominent," he says.

With increased volume in voice platforms, CFT had to ensure that brokers had what they needed to be productive. The company ordered a lot of equipment for its staff, L'Huillier says, according to the varying needs of senior brokers, junior brokers, and back-office and IT staff: thousands of screens, and hundreds of PCs and laptops.

"We probably bought most of the world's supply of Logitech cameras," he quips.

Senior CFT brokers, for example, now have three screens in their homes plus a physical dealer-board, speakers, and a camera. IT staff have a small laptop, which connects to a PC in the office via a login, and there are five different settings configured according to who is logging in. CFT closely monitored brokers' connections to make sure they weren't disrupted by people sharing their household, such as homebound kids streaming Netflix.

CFT implemented Zoom on premise, rather than in the cloud, which allowed it to sidestep the security concerns that emerged around the popular video conferencing app. The company operates its own Zoom instance within its own network and its own Zoom rooms with password protection. Brokers have their own Zoom Room that no one else can access.

"We learned to put in place a proper business continuity plan in a month," L'Huillier says. "The financial industry used to spend tens of millions to come up with BCPs that could never be triggered because none of the use cases planned for actually happened. We spent a significant amount of money in March, but it was a good investment. We put 600 people to work, and within a month, we had a BCP that will serve us for the foreseeable future." wt

Firms Hone Use of New Alt Datasets to Pick Covid-19's Winners

Investment managers are starting to use alternative data to assess the pandemic's effect on individual stocks. By Faye Kilburn

The Covid-19 outbreak has accelerated the use of alternative data in investing. The first stage of its use saw firms apply alternative data mostly in macroeconomic forecasting or to assess the impact of the pandemic at sector level. Increasingly, though, as investors refine their use of the data, they are searching out indicators that tell them about the prospects for individual companies.

PanAgora Asset Management is using natural language processing to gather and process data on Covid-19 scientific research. The firm has repurposed an existing machine learning model designed to determine—based on medical trial results—which biotech stocks would do well and which would perform poorly.

"We took our model that looks at individual companies and instead applied it to all the drug trials currently underway for Covid-19," says George Mussalli, chief investment officer and head of equity research at PanAgora. News reports imply a vaccine is expected in the fourth quarter of this year or the first quarter of next year. "But we asked ourselves: What's the probability that one of these therapeutic trials works, or one of the vaccines gets approved by the the Food and Drug Administration (FDA)?" he says.

The model found there is a better than 80% chance of successful treatments for the virus by the fourth quarter. But the outlook for a vaccine is less promising, with the cumulative probability of success a little above 50%. There are more than 130 drug trials for a Covid-19 vaccine and more than 1,100 therapeutic drugs in testing.

George Mussalli
PanAgora Asset Management

To train the model, the firm fed it data on every vaccine trialed by the FDA for the past 30 years, gathered from clinicaltrials.gov. The results come with caveats, though, Mussalli says. There are many more trials for Covid-19 than other viruses, perhaps raising the chances of success. Equally, the FDA may approve a drug that turns out not to be up to standard.

Once drugs are available, the firm will probably start tracking data on the section of the FDA website where doctors and patients report drug side effects. "The big risk is for the first year. You might have unknown side effects that cause the drug to get pulled off the market. We've seen that before. Then there is a higher probability for the drug company's stock to tank," he says.

Mussalli admits it's difficult to understand the impact of Covid-19 on stocks and to gauge what effects are already priced into the market: "We saw early on, before unemployment went up, people searching on websites and talking on social media about how to apply for unemployment benefit. So now we're looking for things like bankruptcy filings and foreclosures to get an earlier sense of what's going on."

Jonathan Berkow, senior quantitative research analyst and the alternative data lead for equities at Alliance Bernstein, says the group has ramped up its web scraping and natural language processing in the wake of the pandemic, to track activity levels in different regions of the world.

The firm is looking at number of cases of Covid-19 per population cross-referenced with economic activity, what kinds of activities are taking place, whether people are working or staying home, even how many are searching on the internet to buy new cars. Some of this data is publicly available. Other data, the firm has purchased. All of the data is then combined with company-specific locations to determine how exposed individual stocks are to the pandemic. "The geographic footprints are critical for determining how firms are going to respond to this pandemic," Berkow says

Neuberger Berman, meanwhile, has also been looking to alt data in recent weeks, including US credit card transactions broken down into households' spending on gasoline, which is increasing with personal car usage, and use of public transportation, which has remained low. The firm is also employing natural language processing to analyze the text of job postings in order to determine the types of projects companies are hiring for. "The amount of data that's available is exploding. Obviously, it was growing already," says Michael Recce, chief data scientist at PanAgora. But the pandemic has forced investors to "go figure things out" as well. "This is accelerating the use of alternative data in the investing world."

Recce says much of the use of alternative data started with restaurants and retail, but has gradually spread into technology, media, telecoms, subscription businesses and healthcare. The business-to-business sector and industrials have lagged behind, but now Neuberger is gathering that information also.

Recce sees additional value in data that can help detect bias in existing signals. Combining geolocation and credit card data, for example, can show how many customers are visiting a store as well as how much they spend. wt

OPEN OUTCRY

"Be agile and be omnivorous, yes. But having said that, there are good mushrooms in the forest and there are poisonous mushrooms, so you need to be able to figure out which is which." **Alexander Lipton, a connection science fellow at MIT**

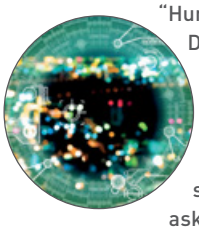
» *see page 14 for full feature…*

"I reviewed the costs, and found we spent the equivalent of two-and-a-half years of work in a month. Everyone was on it, including me, building laptops and PCs and anything else we needed to work remotely. It was intense." **Yann L'Huillier, CFT group chief information officer**

» *see page 6 for full feature…*

"LONG LIVE COBOL! It keeps me employed at 65 years old!" **Wayne Linksman, consultant**

» *see page 26 for full feature…*



"Hundreds of thousands of interactions. Different technologies. Different geopolitical distributions. Different people using them. Different functionalities. When you multiply that by the complexity of these kinds of architecture, and these big systems and organizations, how do you ask simple questions of such a complicated landscape? Who's using which technology? Which system does risk management? Which one is deployed in this location? Which one's out of date on this piece of software?" **Russell Green, head of group architecture at Deutsche Bank**

» *see page 30 for full feature…*

"Because it hadn't been tested in a production environment since December 2008, any venue that says that after they resumed everything they were 100% sure that it was all going to work perfectly is not being truthful." **Laurence Rose, chairman and CEO of Omega ATS**

» *see page 32 for full feature…*

"For startups, real estate can be very hard to find, and very expensive. So why not have banks partner with fintechs and provide space for them." **Mark Kovarski, co-founder and CTO of Alegious Innovative Partners**

» *see page 18 for full feature…*

"You pick up people's body language, their movements, if they are going to meeting rooms [at strange times]. You overhear things in the kitchen. You don't realize how much information you absorb about what is going on in the firm [when in the office], if people are anxious, shifty, or whispery." **Clem Geraghty, head of compliance at Ardevora Asset Management**

» *see page 10 for full feature…*

"Hospital bonds are an important part of the muni environment. Since elective surgery is on hold, studying traffic back to these hospitals is important for bond pricing, default risk, and recovery rates. It is also the case that the community suffers since the largest employer in many communities are the hospitals." **Dean Barr, head of bespoke projects for alternative data provider Eagle Alpha**

» *see page 28 for full feature…*

"If you'd asked me a couple of months ago, 'Could you have the whole bank working from home and still be providing all services to customers in a seamless manner?', I would have been surprised." **John Hinshaw, group chief operating officer at HSBC**

» *see page 22 for full feature…*

"Bots, once developed and deployed, work unattended almost 24 hours a day with just some monitoring for upkeep, in case other systems cause any outages," Yusuf says. "They are usually a very low-maintenance digital workforce; they don't need any coffee to go on and are producing much higher output." **Shafi Yusuf, head of transformation and digitization at Bank of the West**

» *see page 34 for full feature…*

Pandemic Fuels New Wave of Surveillance Tech

Firms are investing in new solutions for monitoring the front office in lockdown conditions, but the latest technologies raise concerns about privacy and intrusion. By Josephine Gallagher

Whispering, jitteriness and signs of frustration are behaviors compliance teams can pick up on when scanning a trading floor or a team of portfolio managers. With staff working from home due to the Covid-19 pandemic, compliance officers in banks and asset managers have to find new ways to monitor employees in the absence of observable behavioral cues.

"You pick up people's body language, their movements, if they are going to meeting rooms [at strange times]. You overhear things in the kitchen. You don't realize how much information you absorb about what is going on in the firm [when in the office], if people are anxious, shifty, or whispery," said Clem Geraghty, head of compliance at Ardevora Asset Management, speaking during a panel at the Summit for Asset Management (TSAM) virtual event that was held at the end of May.

The risk of employees making mistakes or committing market abuse is heightened, as Covid-19 has caused massive market volatility. Portfolio managers, traders and salespeople could panic due to missed targets, and try to claw back losses by committing fraud. Other issues could arise if a salesperson speaks to clients outside of their jurisdiction, or their professional category, said Geraghty. "We've learned from the financial crisis that when times get tough, people do silly things," he said.

These conditions mean that banks and investment firms have to step up their surveillance measures to better monitor trader behavior and deploy broader coverage of front-office communications to detect any signs of unlawful activity or market manipulation, such as insider trading, money laundering, and market rigging.

Ardevora's compliance team, for one, is having to monitor front-office communications by sifting through a raft of emails, chat messages, and call recordings. But there is only so much information that can be gleaned from electronic and voice communications; having a literal line of sight into the office is crucial to the surveillance process.

Moana Moore, head of compliance at Triton Investment Advisors, said the firm normally monitors electronic

communications. "But we've been doing a bit more in relation to e-comm monitoring and watching out for unusual behavior, because we're in unusual times, and we're not on the trading floor anymore; we're working from our homes, and those boundaries blur.

"There are disciplines that we've instilled into our investment business professionals while in the office, but they run the risk of blurring when they're working from home," said Moore, who also spoke on the TSAM panel.

Moore said she has been pushing Triton to record more trader conversations and weekly meetings, but has been met with some reluctance internally.

Blurred Lines: Personal vs. Business

Traders and portfolio managers aren't allowed to use unmonitored devices for business communications, but working from home has made this increasingly difficult to police.

In response to the challenge, many vendors, such as NICE Actimize, Digital Reasoning, Behavox, and more recently, Symphony, have integrated with messaging applications like WhatsApp and WeChat. Franklin, Tenn.-based vendor Digital Reasoning can overlay surveillance capabilities with the Zoom video calling platform, which has jumped from 10 million to 200 million daily users during the pandemic.

But these communication apps are also for personal use, so overlaying monitoring tools raises concerns around privacy and keeping the division between personal and business matters. A key consideration in this regard is the duration of current lockdown situations in various countries. If they disrupt firms in the long term, traders continuing to work from home will probably have to accept a privacy trade-off.

"If more remote or home trading becomes the medium- or long-term outcome, I think you need to contemplate what that divide is going to be between private and business and what that is going to look like," says James Kemp, managing director at the Association for Financial Markets in Europe.

"If more remote or home trading becomes the medium- or long-term outcome, I think you need to contemplate what that divide is going to be between private and business and what that is going to look like." James Kemp, Association for Financial Markets in Europe

"Do we need to have completely intrusive technology in remote environments? Or are we going to find solutions that work differently? Alternatively, rather than trying to think you're going to solve it all on the front end—which might mean cameras, recordings, etc.—do you rather enhance what you do on the monitoring side for post-trade?" Kemp says.

Banks and investment firms are legally obligated to monitor front-office communications on their own devices and software, under rules such as the Market Abuse Regulation, but in March, several regulators, including the Financial Conduct Authority (FCA), issued forbearance to financial firms on the recording of calls. Yet in those situations where it is not possible to record the communications, firms are expected to take steps to mitigate outstanding risks, such as deploying enhanced monitoring or having the ability to retrospectively review trader activities post-Covid-19.

So if a regulated individual is using a personal device for business interactions, it must also be monitored, but doing so requires employee consent.

"One of the things that's clear is that employees should have no expectation of privacy. If, for example, you are sending an email, the company has the right, in most cases, to read that email. So, you should not be doing it if you don't want anything observed," says Lee Garf, general manager, and chief product officer at NICE Actimize.

A monitoring application is very simple to deploy. A trader or portfolio manager can easily install an app on their mobile device, the financial firm would then secure that device and the technology would operate behind the scenes, monitoring the user's communications.

James Kemp Association for Financial Markets in Europe

But how does compliance differentiate business conversations from personal ones?

They don't, says Danielle Tierney, a capital market structure and financial technology analyst at Greenwich Associates. When a device is monitored, that includes all calls and interactions.

However, Erkin Adylov, founder of Behavox, says the vendor's machine learning technology can distinguish between personal and business-related conversations.

"The technologies have matured enough where [the machine learning tech] actually knows that this is related to business and this is related to personal. It is able to distinguish that, and as a result is able to silo conversations that are private and put them into a box that says, 'This is not important, not relevant, don't read it.' And anything that's related to business it would flag up to a different algorithm to check the business communication and make sure there are no compliance breaches," he says.

Other vendors are building functionality to alert users who are messaging individuals with a tapped device that their conversation is being monitored. The user would get a notification if they messaged a person with a monitored device.

One of the biggest pushbacks from employees subject to surveillance is about who pays for the device in the first place.

"I do hear complaints if the firm does not provide or pay for the device," Tierney says. "So, they think, 'Why do I have to put your monitoring [tech] on my device when you're not even paying for it?'"

Tierney says an employee could choose to act unlawfully by using an unauthorized device, but the bottom line is that financial services firms must provide their staff with the necessary tools to be compliant.

As a second line of defense against misconduct, financial firms are looking to new technologies that can profile the behavior of front-office teams.

A New Frontier: Behavioral Monitoring

Traditionally, financial services firms have detected market abuse being discussed in voice or chat communications using a lexicon, a list of words relating to bad behavior. But in cases like Libor fixing, traders just avoided using those words to trick the system, or took their conversations offline. The solutions that emerged after this scandal and others include surveillance technologies that used natural language processing and machine learning to identify unusual behavior and understand trader sentiment.

Digital Reasoning captures data from emails, chat applications, and voice calls. It transcribes voice to text, and the machine learning technology is trained to detect language that could be connected to market abuse and understand the context that frames it. The vendor also looks for unusual behavior patterns that could indicate secrecy or collusion.

Tim Estes, executive chairman and co-CEO of Digital Reasoning, says there are three important indicators to look out for when monitoring trader behavior: signs of secrecy, business language, and the parties changing their communications venue.

Lee Garf
NICE Actimize

"If someone is trying to not be detected because they are talking about something sensitive, that is not wrong. Sensitive could be a personal thing, sensitive could be a professional thing. Once it is a business thing, with business deal language … and they get a little bit concerned and decide they want to take it off-channel, like through WhatsApp, because it's too sensitive [for the monitored channel], when you have those three behaviors together, that is a real warning sign," Estes says.

Digital Reasoning built a tool called Cognition, which is used to fast-track a firm's ability to train machine learning models. The tool uses active learning and interfaces to allow analysts or compliance teams to input training data, such as examples of unusual behavior, without the need for data science skills.

One example is pressure language, when sales teams become too aggressive with clients. Digital Reasoning's training tool has been used to detect and pinpoint signs of this happening.

Behavox provides an end-to-end data platform designed to help financial firms act on their data. Within that, it uses machine learning technology to detect patterns and risks across voice and text data and supports multiple languages, including English, Arabic, and Russian. The system can then generate specific alerts that are tagged and sent to the compliance team. Some of the tag categories include bribery, insider trading, discrimination, racism, sexual harassment, and corruption. The Behavox platform works by masking the sensitive data and storing it in a location where the financial firm's compliance team can only access it if they have appropriate authorization.

"It's stored in a location that is accessible only to the legal team that has the client privileges, but to get that access, [the alert] has to be escalated. So you have to seek permission to it through the Behavox system from the head of

legal, so only the general counsel of the company can give you the authorization to go and view what the system deems to be personal," Adylov says.

NICE Actimize pulls in data from order management systems and execution management systems to capture the trade information and help create a timeline around the execution. The vendor takes communications data from emails, desktop phones, turrets if they are a trader, collaboration tools such as Bloomberg, Symphony or Microsoft Teams, and chat applications like WhatsApp and WeChat.

NICE Actimize can also integrate its technology into mobile phones through the carrier under a tri-party agreement with the provider and the financial firm.

"We're capturing [the data] through the carrier so some mobile providers have support for that, like we have one client that has, globally, seven different mobile providers, and we're integrating with each of those," Garf says.

NICE Actimize can also capture location data from the monitored device to see if the individual is trading or working where they say they are.

"While they are making a phone call, it's recorded and we can recapture that and then analyze it. Text has a similar idea but there is also attribute information about those communications, like time and the location attributes, that we can capture," adds Garf.

Data can also be pulled in from human resources systems to triangulate abnormal behavior—for example, if a trader is on vacation but the system shows they are actively trading.

Cloud adoption has been a significant driver in being able to access these data channels, says Garf. Prior to the cloud, normalizing data on-prem has proved complex and time-consuming.

Advancing the Scope

Regulators are looking for financial firms to better detect areas of misconduct. As a result, banks and asset managers are taking steps to broaden their scope beyond trade surveillance to include workplace analytics and human resources-related monitoring.

As mentioned above, firms are looking at ways of identifying and stamping out discrimination, racism, indicators of sexual harassment, or bullying in the workplace. Another sign being monitored is employee morale.

> "Pre-Covid, it was easier to enforce those rules. Now it is more difficult to enforce, and how do you ensure that there is no 'bro' culture happening in the company? What we're seeing across our clients is a spike, an increase in the sexist, racist, and discriminatory language that people are using in their communications between each other. There is also a rise in frustration from the work-from-home environment." **Erkin Adylov, Behavox**

Some believe Covid-19 has exacerbated the need to deploy technologies that can more closely monitor and flag these types of instances.

"Pre-Covid, it was easier to enforce those rules. Now it is more difficult to enforce, and how do you ensure that there is no 'bro' culture happening in the company? What we're seeing across our clients is a spike, an increase in the sexist, racist, and discriminatory language that people are using in their communications between each other. There is also a rise in frustration from the work-from-home environment," Adylov says.

This is done by monitoring communications and analyzing text and sentiment from surveys and complaints, both from the financial firm's employees and clients. This could detect potential flight risks, where an employee is planning on leaving, or a severe customer complaint that could lead to litigation.

Estes says these kinds of analytics have to be used by a trusted party within an organization to ensure they are dealt with appropriately and effectively.

"I think the audience for that has to be immensely qualified, like HR professionals who know the law, who is going to handle that kind of stuff immensely and sensitively, and not just any peer/supervisor," he adds.

Adylov also says banks, hedge funds, and regulated entities are further extending their monitoring capabilities to cover their entire employee count. Adylov adds that regulators are encouraging this level of surveillance as the technology becomes more available.

He says two of Behavox's clients—a large Japanese bank and a Canadian bank—are both looking to extend monitoring to all their employees over the next three years.

"So the industry is changing from sampling, from randomized monitoring and limited monitoring, to monitoring of everybody, because it's the best thing to do, because the regulator is demanding us to do it and technology is available to do so," he adds.

Danielle Tierney
Greenwich Associates

Orwellian Issues

Systemically important institutions, like major banks, are heavily regulated because of their role in supporting the economy. Regulatory scrutiny could lead to all employee business interactions and communications being tracked in the future. That surveillance could spill over to employees' private lives.

Tierney says financial firms are obligated to monitor activity that is tied to trading. Anything beyond that should not be considered part of market surveillance.

Some have raised concerns that tech solutions go far beyond what is necessary for normal monitoring. Kemp says some providers are starting to deploy camera technologies for recording the user to make sure they are in front of the screen. If they move away, a message pops up to ask: Where were you and what were you doing?

Estes says providers have a responsibility to ensure they do not overstep their position such as by accessing the data or making employees feel uncomfortable with the technology being deployed.

"The area of workplace analytics has to be done as a very close and thoughtful development with a client or a bank because you could be getting into almost Orwellian issues really quickly," he says. "It's very important to find the line between listening and awareness so that you can be a better employer and coach a better workforce, [without] everyone feeling like they are being spied on." wt

Quants Use Nowcasting As Covid Crystal Ball

Experts from UBS, Unigestion, MIT and QuantConnect discuss the need for nowcasting, and what the alt data boom has made possible in trying to navigate the coronavirus crisis. By Rebecca Natale

As the effects of the coronavirus continue to ripple through parts of the world and its economies, quants are navigating the pathogen and its effects with the help of nowcasting—a portmanteau of "now" and "forecasting" that uses unstructured and structured data to predict possible scenarios happening at present or in the very near future.

The concept of nowcasting isn't new, but it's gained notoriety throughout the crisis as investors, researchers, and analysts are hungry for real-time data on things that aren't normally available in real-time, including GDP, employment, inflation, and other economic indicators.

Coined in 1980 by British meteorologist Keith Browning, it has expanded into the fields of healthcare and finance—most notably by central banks, such as the Federal Reserve Bank of New York, which in 2017, laid out its approach to nowcasting the economy using big data in a staff report. The Federal Reserve Bank of Atlanta is another such example, as it hosts a running estimate of real GDP, called GDPNow, which it says is similar to the one used by the US Bureau of Economic Analysis.

In 2015, CAIA Association member Alexander Ineichen published a report that argued nowcasting could be used as a new risk management tool, citing one of the downfalls of forecasting using data with longer lag times: "At the beginning of 2014, 72 out of 72 economists 'predicted' that U.S. interest rates would rise throughout the year. They fell."

The Covid-19 pandemic, however, has shed new light on the prediction model. Its need is most pressing when conditions are shifting rapidly. That's where alternative data has stepped in as the differentiator from past financial crises. Nowcasting married with the alt data boom—which has made metrics such as foot traffic, satellite imagery, and web-scraped sentiment commonplace—has added a useful tool to the quant arsenal.

Navigating the economic effects of the coronavirus has meant working with virtually no benchmarks or base rates, says Jeremy Brunelli, a data specialist in UBS's Evidence Lab, which works with analysts, traders, and portfolio managers across asset management and UBS O'Connor, the bank's multi-strategy

hedge fund. It uses artificial intelligence (AI) to solve bespoke problems, and sources alternative datasets to drive excess returns for investors. The team has been occupied with understanding which countries are flattening their curves of new virus cases, how consumers have changed their behaviors, and whether previous behaviors are returning, relating to that deceleration.

"Right now, things are moving so fast. I would liken this period—and there are a lot of differences—to my experience when the [2008] financial crisis happened. But really, it's very similar in the sense that traditional measures didn't work anymore. Things were changing hour to hour, day to day. So I leveraged a lot of alternative datasets back then to try to get a grasp of what was going on," he says.

The Evidence Lab Nowcasting Model uses 20,000 data sources to create signals for various markets—for example, automation equipment or farm fertilizer—which make up the broader economy. The lab creates 50 to 60 different market signals for North America, Europe, and Asia. It recently used foot traffic and public transit ridership, paired with pollution data, to understand which industries are contributing more pollutants, therefore indicating a return to "normalcy," and to paint the picture of how a recovery unfolds.

"Right now, things are moving so fast. I would liken this period—and there are a lot of differences—to my experience when the [2008] financial crisis happened. But really, it's very similar in the sense that traditional measures didn't work anymore." **Jeremy Brunelli, UBS**

An important distinction is that Evidence Lab adheres to a Bayesian technique, which Brunelli describes as a mosaic. It involved working with a lot of different data points, none of which are meant to offer a discrete forecast, per se, but indicate an increase or decrease in confidence in a given hypothesis. So, for example, they collect five data points related to one central idea but aren't related to one another. Three of them may show a positive signal, while two are neutral—showing that something positive is likely happening there.

The technique is especially useful when working with data points that don't have long histories, which is the case for many alt datasets. There is a risk, though, as this process means that sometimes users have to accept more significant standard deviations, but it's a way to make decisions when you have to make them quickly and with many factors, Brunelli says.

A Delicate Blend

Geneva-based asset manager Unigestion has relied on nowcasting in its investment process for several years. Its proprietary tool, Nowcaster, is used to create regimes in three categories—growth, inflation, and market stress—for strategic asset allocation and dynamic asset allocation, a long-term and a short-term active investment strategy, respectively.

The investment manager added an alt data extension to the tool, specifically using news sentiment, to measure and predict inflation, in tandem with data from RavenPack, which provides stock-specific and macro sentiment analysis and scores, says Robert Kosowski, head of quantitative research for Unigestion. They compared the impact of alt data to the traditional Nowcaster system, finding two interesting takeaways.

First, incorporating macro news sentiment into traditional nowcasting—Unigestion calls these "newscasters" internally to delineate between the two—were historically leading the actual time-series information. That was useful for asset allocation as it allowed the firm to anticipate market changes earlier. Second, after allocating across asset classes and within asset classes at different premia, they found that "newscaster" performance, on average, was actually superior to using Nowcaster as a standalone.

Is alt data important to nowcasting at Unigestion? The short answer is yes, but Kosowski says it's more useful to treat alt data as a separate category, and then figure out how to combine it with the traditional market and reference datasets.

"What I mean by that is imagine you have 100 time-series that you use for your nowcast—all of them traditional—and now comes along series 101," he says. "Now one of the reasons why we find it doesn't work if you just add it, is the averaging—you've got 100 time-series,

The Shape of Covid

Cornell University's Marcos Lopez de Prado and MIT's Alexander Lipton are collaborating on a large Covid-19 project. Their *Three Quant Lessons from Covid-19* joint report is only one part. The two are using the study in their efforts to build models for other aspects of the disease beyond its ramifications in finance.

As our sibling publication *Risk.net* previously reported, the duo is using options pricing and machine learning to gauge the wider cost of virus control measures and help leaders decide when to lift lockdowns. Additionally, and in collaboration with academics from the Hebrew University of Jerusalem—where Lipton is also a fellow—Lipton hopes to assess the effects of children returning to school.

In April, they released another study, *Exit Strategies for Covid-19: An Application of the K-SEIR Model*.

"In this study, we introduce a new mathematical model (called K-SEIR) to simulate the outcomes of lockdowns, and help evaluate various exit strategies. We demonstrate that targeted lockdowns can achieve better outcomes than universal lockdowns, in terms of: one, saving lives; two, protecting the most vulnerable in society (the elderly, the poor); and three, preventing the depletion of medical resources," the abstract reads. "K" stands for "K-groups," and "SEIR" stands for "susceptible, exposed, infected and removed."

Lipton spoke to *WatersTechnology* on June 1 when he was in the middle of writing the project's most comprehensive study thus far, an examination of what he calls "an unprecedented failure of epidemiology as a science."

Typically, epidemiologists react to pandemics and epidemics either through top-down approaches, which look at the population as a general whole and make indiscriminate mandates, or bottom-up approaches, which call for self-motivated, community-led measures that rely on assumptions about individuals' habits and conditions.

"What happened was both models proved to be completely wrong," Lipton says. "And the predictions were really catastrophic. And governments acted on this. But the truth of the matter is that what they actually used was a uni-model approach to this particular epidemic, by which I mean they treated the entire population with the same brush, so to speak. This particular pandemic is actually distinctively bi-model in nature."

This means there are two large, distinct groups—older people and those with comorbidities, and younger, healthier people. By creating a model for each group, they have been able to analyze in much finer detail what should have been done instead and how those measures might have been carried out. "That's what we've been working on, and we drew some conclusions—not that those conclusions really had a tremendous impact on the powers that be, but at least we articulated what we felt is the right approach to the problems. … We will see. Time will tell. Time will tell who was right," he says.

one comes along—it would naturally have a lower weight."

Unigestion instead overlays the news data on top of its first prediction that uses its historical time-series data, to determine how announcements might affect the predicted outcome.

Seeing the Future

In late March 2020, Marcos Lopez de Prado of Cornell University and Alexander Lipton, a connection science fellow at MIT, released a joint study, *Three Quant Lessons from Covid-19*, which argues the importance of nowcasting in quantitative finance going forward.

The study bases its argument on the grounds that quant funds could have been better prepared for the Covid-induced sell-off. The SARS-CoV-2 virus was isolated on Feb. 11, 2020; despite that, the market continued to rally, with the S&P 500 peaking at an all-time high eight days later. Nowcasting, the study contends, helped certain market-makers handle the coming volatility, as these prediction models showed supply-chain disruption from government-led lockdowns earlier than traditional forecasting models.

"Days before the Covid-19 sell-off started, there were plenty of warning signs that the virus was disrupting critical supply chains in China," the study states. "Thanks to their nowcasting of order-flow imbalance, very few market-makers experienced losses during the sell-off."

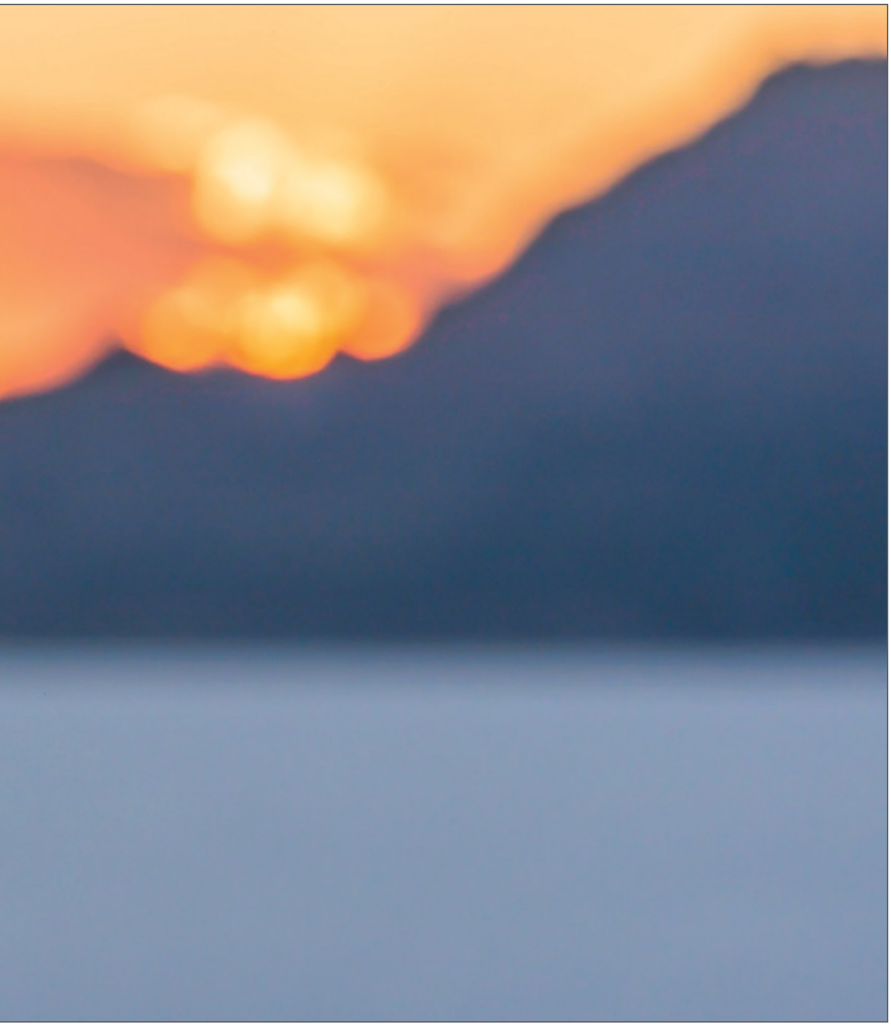
Lipton, a former executive at several financial institutions—including Bank of America, Merrill Lynch (and the combined company), and Citadel—tells *WatersTechnology* that nowcasting, when done right, is about thinking outside the box. Time-series and market data aren't and won't be enough to get through this crisis. And it should teach firms that they need to be nimble and reactive enough to adjust their trading strategies as easily as winds change.

"Be agile and be omnivorous, yes," Lipton says. "But having said that, there are good mushrooms in the forest and there are poisonous mushrooms, so you need to be able to figure out which is which. And it's not always possible, but you need to have some guidance. And the guidance is: Don't look for back-testing, per se, but look for more theories."

By that, he doesn't mean to build a whole theory of the economy but look for and determine causality between different data streams.

"Have a good idea why things happen, rather than just simply observing how they evolve," he says.

Of course, some things cannot be predicted. Nowcasting cannot predict



the time nor location of, say, an earthquake, though once one is detected, in a very short amount of time and with high accuracy, it can tell which regions will be impacted by the shock wave and which coastal sites will be impacted by the tsunami. The example translates to the markets. Nowcasting couldn't predict that there would be a pandemic of this magnitude, but once it started to gain traction, nowcasting could have been used to identify areas that would be hit the hardest, as well as where ripple effects would be felt and to what degree of intensity.

By its very nature, and when used appropriately, nowcasting dictates that what works today will likely not work for tomorrow; that's the beauty and the challenge of these models—they aim to predict the "now." Undoubtedly, firms will use some of this time to create trading strategies that can help with a similar future scenario—but they shouldn't, Lipton says. The next time around, there will be other foreign and unprecedented factors, and today's pandemic trading strategies won't fit the bill. That brings Lipton back to the key pillar of the study: the ability to pivot.

Nowcasting in Motion

The Covid-19 pandemic has been something of a proving ground for technologies and strategies, as trading firms are literally having to put their money where their mouths are. As the world becomes increasingly interconnected, Lipton says pandemics happen with "depressing periodicity, and in fact, this periodicity is increasing," making the case that increased interest in nowcasting is more likely an emerging trend than a blip.

Jared Broad, CEO of crowd-sourced algo trading platform QuantConnect, says it's been exciting to see nowcasting algos tick up in usage over the last few months. The vendor allows quants and programmers to test their hypotheses on its platform, then sell the algorithm's licensing rights on its Alpha Streams marketplace, where quant funds and other proprietary trading shops can compete for those rights.

Jared Broad
QuantConnect

He adds that these nowcasting algos have allowed quants to perform reasonably well, compared to the market. Alpha Streams quants deploying a nowcasting algo have seen drawdowns between 10% and 20%, whereas the S&P 500 suffered a 33.9% drop between its February peak and April 2, Broad says.

Nowcasting's rise mirrors a discussion under way in the value-vs.-momentum space, Broad says. Some investors—such as those who practice environmental, social, and governance (ESG), impact, or passive investing—are trading on value indicators like carbon emissions or energy efficiency that make more sense to buy and hold. On the flip side, as the market is rife with volatility, companies trading on momentum are doing well—sometimes better.

"Looking at what *is* and looking at what *will be* in the very short-term future is a way to sort of increase your chances of success by making a shorter-term prediction on where the world will be in the next hours, days, [or] maybe a week," Broad says. "So with that core thesis, you can change the way you experiment with data."

Nowcasting's usefulness in portfolios, stock choice, and trading strategy largely revolves around volatility and outright crisis, so it's certainly not a silver bullet for all markets all the time. But as geographies and economies become increasingly interconnected, volatility will be a constant, even when seas seem smooth.

As for what will happen tomorrow, the nowcasters can only guess.

"Now we're getting a lot of questions about what's next: 'What is the new normal?'" says UBS's Brunelli. "And that's becoming more of a future-casting, kind of difficult thing to predict. And that's where nowcasting probably doesn't do well." wt

Space Exploration: How Will Banks Handle Unwanted, Costly Real Estate Post-Covid?

Financial firms spend a lot of money on office space, but what happens to that space if more employees are working from home? Perhaps something of a WeWork for fintechs is the answer. By Max Bowie

With much of the US economy beginning to reopen for business, coronavirus or no coronavirus, capital markets participants are being typically risk-averse, with upwards of 90% of financial firms' headcount working remotely, and seemingly a new firm every day saying it will implement extended work-from-home programs for staff, or allow employees to work from home indefinitely. The result is that these firms now face the prospect of paying for substantial amounts of office space that may remain empty for the foreseeable future.

Some of the costs associated with this space—workstations, software licenses, and the staff that use them—are still valid, because those paid employees are using the software licenses, whether they are at home or at the office. But for firms that don't own their own space, rent—and for all firms, other costs, such as utilities, infrastructure, and maintenance of all the above—must still be paid, whether the space is being used or not.

"I think ultimately, everyone will return to the city once things shake out. With the short-term hysteria, we are seeing a lot of pricing adjustments to keep tenants. But firms have to figure out their strategy and what to do with excess space, and whether that will just be short term, for six months, or for a year," says Peter Sabesan, managing principal at real estate company Cresa.

Working from home isn't new, though the scale of work-from-home programs and the length of time that firms' offices have been all but empty is unprecedented.

"More embracing of working from home has already been happening over the past four or five years," says Anthony Woolley, head of business development in Europe at Ownera, a blockchain platform for digitizing ownership of digital securities. "I've seen a lot of big banks looking at working from home possibilities and asking whether it allows them to provide flexibility, run a geographically diverse workforce, and help from a business continuity perspective.

> "For startups, real estate can be very hard to find, and very expensive. So why not have banks partner with fintechs and provide space for them?"
> **Mark Kovarski, Alegious Innovative Partners**

"Parallel with that, banks are working more closely with fintechs, and many banks have set up accelerators on their own premises, in a WeWork style. And in the last two or three years, we've seen the rise of banks as venture capital (VC) firms. Originally, banks' VC arms tended to be quite separate from the rest of the organization. But in the last two or three years, banks have realized that if they are going to have a VC function, it should not be a classic VC function, but should be more strategic. Yes, the aim is to make money, but it should also be a strategic investment that is backed by one of the business divisions. So there is a lot of benefit to having those parties working closely and on-premise," adds Woolley, who served as chief innovation officer at French bank Societe Generale prior to joining Ownera.

Cost Dilemma

Real estate is typically a financial firm's second-highest expense, behind staff and above the cost of market data—which itself can run to hundreds of millions of dollars for medium- to large-sized financial institutions. Firms that own their buildings may be able to easily sell off or rent out unused space—although they may lose the right to name their building if their ownership and occupancy levels fall below a certain percentage—but those who lease space may be tied to lengthy rental agreements. And though landlords may be willing to offer rate cuts for leases coming up for renewal in the near term, they are unlikely to forgo long-term income by allowing clients to wiggle out of their leases.

So, for firms that can't save money by reducing their space, one option is to find ways to make money from the space—either directly by subletting it, or indirectly by using it to foster some kind of longer-term investment, such as by using it to house companies in which a firm owns a stake, and by charging only nominal rent, to contribute to those startups' profitability, and giving them access to the enterprise-grade infrastructure and office space used by their owners and clients.

Mark Kovarski
Alegious Innovative Partners

Tom Perigoe
Consultant

Alexander Ross
Illuminate Financial

With some startups—especially the new wave of alternative data providers—expected to be hit hard by belt-tightening measures resulting from the Covid-19 outbreak, financial firms that rely heavily on specific vendors, or which may have taken a stake in a supplier, want to protect their competitive advantage and their investment. One way firms can do this is by letting fintech firms take advantage of their empty space, sunk infrastructure costs, and the expertise and input from on-site bank employees who would be potential consumers of a vendor's services.

Certainly, there are some aspects of space occupied by financial firms that lend themselves to fintech occupancy. Tom Perigoe, an industry consultant who has designed and built out trading floors in past roles, including at Bank of Montreal, says the office space occupied by financial firms that has been designed and built to serve specialist use cases—for example, to house trading floors or support high-volume risk calculations or back-office processing requirements—often includes custom features such as an independent and "oversized" electrical supply; raised floors; additional heating, ventilation and cooling (HVAC) capacity; and infrastructure to enable high-density occupation. For fintech firms, the opportunity to move into such a ready-made environment, rather than having to invest in building those improvements themselves, could be appealing, especially if the bank can offer the space at a price point that reflects the scale and term of its lease, and the fact that those improvements have already been accounted for.

"In an office tower, floor space has different qualities and different

> "Banks are working more closely with fintechs, and many banks have set up accelerators on their own premises, in a WeWork style. And in the last two or three years, we've seen the rise of banks as venture capital firms. Originally, banks' VC arms tended to be quite separate from the rest of the organization. But in the last two or three years, banks have realized that if they are going to have a VC function, it should not be a classic VC function, but should be more strategic."
> **Anthony Woolley, Ownera**

price points, and therefore different 'values' to a tenant—whether that's the bank historically, or fintechs in the future," Perigoe says. "Certain lines of business (those in a trading room) and supporting functions with a requirement for continuous operation require specialized infrastructure beyond that of the 'base building,' including raised floors, uninterrupted power via battery and diesel generator, and locally resilient IT infrastructure."

Startups typically don't have the resources to afford this kind of space, but could take advantage of banks' existing infrastructure investments. "For startups, real estate can be very hard to find, and very expensive. So why not have banks partner with fintechs and provide space for them," says Mark Kovarski, co-founder and CTO of Alegious Innovative Partners, a "startup studio" that works with entrepreneurs to incubate and accelerate innovative startup companies.

"I believe these large enterprises will start partnering with startups," Kovarski says.

In fact, one of the startups Kovarski is working with is RedVault Analytics, an "intelligent lease optimization platform" that helps companies manage their real estate assets more efficiently and to build marketplaces around their office space. With so many bank staff forecast to remain working from home at least in the short term, this represents a "tremendous opportunity," he adds.

Until now, the potential for large swathes of office space being empty had not been on firms' radars, says RedVault president Paul Wilson.

Anthony Woolley
Ownera

Paul Wilson
RedVault

"I believe the work-from-home option is going to continue to grow," both as a way to de-risk rising costs as the world introduces Covid-mitigation exercises in the workplace, as well as to just prevent the spread of the disease, Wilson says. "The cost of real estate in a major city is $15,000 per person annually. So if people return to offices and need to practice social distancing, they will need more space, and that cost will go up."

RedVault helps firms audit their real estate costs, and negotiate leases, which involves digitizing and extracting information from paper documents using artificial intelligence. Once digitized, the vendor can analyze that wealth of data to help firms assess their spend against an industry average, save money by making better decisions about their office space planning and spend on real estate and related services. But for firms tied into leases running 10, 15 or 20 years, encouraging fintechs to use their excess space would be an "excellent" use of existing resources, allowing firms to monetize their leases while safeguarding their fintech investments, Wilson says.

More Than Just Space

Those who have seen these kinds of initiatives work in practice note that to be successful, they must involve more than just the sharing of space: There needs to be an element of knowledge sharing, too.

"The potential for clients to want to unload unused office space to startups has been explored for years," says Mike Gleason, partner and director at Bannockburn, Ill.-based IT services provider and consultancy Netrix. "The successful ones I have seen coordinate the office space with a curriculum—meaning they used the space more like a startup 'lab,' or internship center or mentoring program.

"Giving office space to a startup within a common vertical would have minimal returns without a full-blown education/mentoring program behind it. Startups would rather be in large co-working digital startup spaces like 1871, Cintrifuse, etc. … that can hold hundreds of startups and broader business educational programs, instead of a small space with only a few startups in it," he says, adding that "it would need to be a large investment of people, capital, and education from an established business to make the startups profitable."

Alexander Ross, investment director of Illuminate Financial, a venture capital fund focused on late seed and Series A funding rounds for enterprise fintech vendors, says there are advantages to co-locating in a firm's offices—such as the proximity to key executives and partners within the firm—but adds that there are more valuable things than space alone. And while space-sharing may solve a short-term problem, it may create greater long-term challenges to organic growth if a vendor is perceived to be too closely linked to one backer.

"By being in a bank's site, you have some immediate association with them," Ross says, which can be a good or a bad thing, depending on different circumstances, adding that some degree of physical separation or "Chinese walls" would be of crucial importance to maintain the image of independence for other clients.

"I would value a 'proof of poncept' or 'pilot' center over a physical presence—an environment where fintechs can access the data and systems they need without using live client data, and cut through red tape so you don't need a hundred signoffs from the CISO and others within an organization to rapidly test new solutions," he says. "The emphasis here is on a standardized partnership agreement, legal framework, and tech environment versus physical location. For a bank to

create a broader incubator initiative, they are probably better off working with a neutral third party, like Barclays' Rise (the bank's tech incubator, whose New York operation is run by tech startup accelerator Techstars) or the Fintech Innovation Lab."

However, this approach can lead to separation between fintech investments and the businesses they are intended to support, since a separate "lab" is by definition not fully integrated into an organization, warns Ownera's Woolley, whereas anticipated space issues created by the pandemic represent an opportunity for firms to create a tighter bond with their fintech investments.

"At Societe Generale, I created a space called The Greenhouse within our building. Because when we looked at it, the challenge was not reaching the fintech ecosystem, but bringing that into the company and having an impact on all employees," by fostering spaces where bank and fintech employees can interact freely, Woolley says. "Another reason to bring these companies into your space, rather than keeping them external, is that they will be in the same space as their sponsorship and budget … and can benefit from the expertise you have across your organization, not just the specific domain they're working in. And when they are in that space, there is the opportunity or the kind of casual interaction you might encounter in a WeWork, not just with specific teams, but with hundreds of employees."

However, the very circumstances that have created this opportunity are also its greatest potential impediments.

"The biggest outlier here is the current market conditions. It has been stated that 69% of companies are shrinking their office space requirement, [while] co-working spaces have to redesign all of their facilities to social distance (and in turn, shrink the desk-to-tenant ratio), and startups are choosing to stay working from home and save travel and rental costs," says Netrix's Gleason.

Mike Gleason
Netrix

But at the end of the day, a glut of empty office space should not be the driving force behind setting up a fintech incubator program—in part because it may be a short-term factor. Instead, it should be a catalyst for new approaches overall. "Spare real estate on its own is not a good enough reason to do this. Any initiative has to make sense to the company," Ownera's Woolley says. "Space is an enabler and a catalyst, but should not be the sole reason for doing it." wt

Banks Grapple with VPN Capacity Amid Covid-Induced Network Strain

Private network limitations and variable internet connectivity have challenged operational resiliency and business continuity plans. By Josephine Gallagher

Financial services companies are under increasing pressure to avoid overloading virtual private networks (VPNs), as the Covid-19 pandemic has forced the bulk of their employees to work from home.

A firm's VPN is typically built to support 20% to 30% of staff working remotely at any given time, but under current circumstances that has increased to 80% to 100%, says Veronica Bocarova, a principal analyst at Cullen International, an independent provider of regulatory intelligence in the communications sector. In some cases, firms are having to allow access to the VPN on a rotational basis to prevent overwhelming the system.

"You realize that you cannot have everybody working at the same time, so you have to schedule sessions, or provide VPN-sharing across employees, like tunnel sharing. So, we have lots of issues that suddenly chief information officers and IT bosses must work out," Bocarova says.

Video conferencing, streaming videos, and hosting webinars consume the most network bandwidth, a problem that is compounded by these types of activities surging over the past few weeks.

High-speed connectivity is crucial for some traders, effectively eliminating the option to work from home. James Kemp, managing director at the Association for Financial Markets in Europe, says that 5% to 10% of sell-side traders are working in their main offices or at business continuity sites.

Traders working in fast-moving markets like foreign exchange require near-real-time access to data. In this case, plugging into the main system remotely can be problematic as a firm's global staff will be simultaneously sending data across the network, causing traffic bottlenecks and latency issues.

"You've currently got that split going on: If you've got a less-active marketplace with slower pricing, you can probably trade that more easily from your remote home location. If you have a fast-moving, latency-dependent, electronic 'flow' market with huge numbers of updates—and I am talking possibly millions, if not billions, a day—you need to be at the end of a very thick pipe," Kemp says.

Some staff have also been allocated to work at their employer's main sites on a rotational basis to alleviate the pressure on the private network. In the first few weeks of March, Gareth Coltman, global head of trading at MarketAxess, recalls speaking to a bank lead, who said the bank was experiencing issues connecting with clients over its VPN.

"They didn't have enough servers to support that kind of connectivity," he says.

And in that case, the bank had some of its traders take turns working from the office to offset some of the limitations in its IT stack.

Adjusting Tech Stacks

In a normal scenario, firms can upgrade their VPN capacity to make room for an expected increase in traffic and usage, but in the current crisis, it's not as easy as that, says Bocarova. Firms had little to no time to prepare as lockdown measures were swiftly implemented across the globe, first affecting the Asia bloc, then Europe and the US.

Scaling VPN capacity to support entire workforces is a major undertaking that can take weeks to implement, requiring IT teams to order technical equipment and install VPN access on local devices. Some of this work means that firms must have IT personnel physically present on site to tune networks, manage traffic, and upgrade servers.

For HSBC, the task involved extending its VPN capacity to support its 235,000-plus employees and client interactions on its network globally. The bank has had to more than double its VPN capability since mid-March across offices in the UK, US, India, China, Hong Kong, Dubai, the Middle East, and Australia.

Gareth Coltman
MarketAxess

Prior to the coronavirus outbreak, a typical day would only see 10,000 to 20,000 employees logging into the VPN at any one time, says John Hinshaw, group COO at HSBC, who joined the bank in December 2019.

Adding to the scope of the challenge, staff accessing the network also needed the right computers and connectivity equipment.

Many HSBC personnel already had company-supplied laptops and the necessary setup. Those who didn't were placed into one of three groups for the purposes of the deployment, which took place over the course of two weeks, prior to which HSBC staff in China were already working from home. The first group of 28,000 employees were sent new pre-configured laptops. The second group, comprising around 20,000 staff, primarily in Asia, were authorized to take their desktop computers home with them. The third group of around 13,000 people was set up with access to the VPN via HSBC's Virtual Connect product from their own devices.

Getting the right equipment to the right people during a global pandemic, when travel is drastically limited, is not a simple undertaking. In India, for example, HSBC had to use a cargo plane to transport 600 laptops more than 500 miles from Pune to Bangalore.

And the work didn't stop there.

"Then we had to tune the network, which was designed for traffic to flow predominantly from building to building, not from home to home, through all the VPN connections. So we had to really look at the network traffic and understand how it needed to be adjusted," Hinshaw says.

The bank increased the capacity in parts of its datacenters and Cisco

switch capabilities. It adjusted the way in which certain software programs operated and computer logins were entered, and changed other system functions to control the amount of bandwidth they consumed. HSBC also accelerated its implementation of Zoom video conferencing across the company. As part of that rollout, Zoom was also configured to operate on the bank's corporate network, and servers are monitored in each country to ensure they can cope with the traffic. HSBC had to provide a list of essential employees to governments, which included employees working in datacenters and those managing the network.

"Employees would go into the datacenters, upgrade the switches, the servers, or the network capability, and that would be either our direct employees or we would partner with technology providers," Hinshaw says.

Adrian Scrase
ETSI

Public Networks

Beyond VPNs, public networks, as well as telecommunication and internet service providers (ISPs) are also having to cope with a huge increase in usage. In a joint statement with the European Commission on March 19, the Body of European Regulators for Electronic Communications (Berec) announced that it would set up a system to monitor the internet traffic situation through the national regulatory authorities (NRAs) in each member state to enable a response to capacity issues.

Berec's fortnightly summary reports showed a huge increase in fixed and mobile network usage during the Covid-19 crisis in March. Its latest report presents a more mixed picture, showing that traffic is increasing, stabilizing, or decreasing to different degrees, according to the local NRAs.

For the most part, the major network vendors have the ability to scale their server and network capacity, but whether that is sufficient—and sustainable for an extended period of time—is another question.

"I think we have discovered, even from a personal perspective, the challenges of bandwidth for remote working," Kemp says. "The internet is not without problems. Even you and I speaking here now, it's pixelating, and we are finding that the ISPs are struggling, and the telecommunication providers are struggling, with the amount of data going over them."

Looking ahead, Kemp says that in the aftermath of the coronavirus, there will be new questions about the definition of operational resiliency from a regulatory standpoint. Factors such as internet access, connectivity, VPN capacity, server bandwidth, remote workplace setups, and more, will all be scrutinized.

"It will challenge us in our definition of what we mean by operational resilience," he says. "Traditionally, we would have thought it means, for example, we get a cyber attack and we go down for two hours and plan for how quickly we get the system back up. I don't think anybody ever envisaged that operational resilience scenarios might mean 80% to 100% of our staff working, trading or running operations over the internet from home, and using laptops. What does that mean for cyber attacks and security? Whoever thought that you would need to challenge the bandwidth of the internet service providers and telecommunications vendors?" he says.

After the crisis ebbs and work practices start to normalize, the pandemic will almost certainly shape future regulation, such as the proposed rules on operational resilience in the UK, and the role of public networks as third parties to systemically important financial institutions.

> "You've currently got that split going on: If you've got a less-active marketplace with slower pricing, you can probably trade that more easily from your remote home location. If you have a fast-moving, latency-dependent, electronic 'flow' market with huge numbers of updates—and I am talking possibly millions, if not billions, a day—you need to be at the end of a very thick pipe." James Kemp, Association for Financial Markets

One of the final steps involved instructing staff members to use their home Wi-Fi to connect to the VPN client portal, which they access using an RSA authentication app on their mobile devices. Users enter a password into the app and it generates an eight-digit number that allows them to access the VPN on a work device.

During that process, the bank also put out a request for employees to come forward to support the IT desk in helping other, less tech-savvy employees, get set up. In response, 500 volunteers across the company stepped forward.

"If you'd asked me [at the beginning of the year], 'Could you have the whole bank working from home and still be providing all services to customers in a seamless manner?', I would have been surprised," Hinshaw says.

Security Hygiene

A VPN enables employees to work and send data across a private network securely by routing their device's public internet connection through the corporate server.

But the security of the technology only goes so far, says Adrian Scrase, CTO at the European Telecommunications Standards Institute (ETSI). How the network is deployed, and how an individual uses it, plays a major part in the overall security of the network.

"Once you have products that are built and are inherently secure, you then have to deploy them in a secure way, and the end-user has to operate them in a secure way. So, while we provide sort of the first level of protection, up to the provisioning of the equipment, there are many other actors that also need to behave in a secure way, including the end-user, if you're going to have end-to-end security," Scrase says.

The dramatic uptick in the use of video conferencing services was

closely followed by a backlash over the security of some of these tools, such as Zoom. Other concerns have emerged as a result of how quickly some of the platforms were released to the market to meet the needs of financial services firms. Collaboration platform vendor Symphony's Meetings tool was launched in mid-April, and it has since looked to push out an end-to-end encrypted and cloud-enabled second iteration of the platform.

Scrase similarly highlights the need to employ these types of platform in a secure manner, such as by using authentication methods and verifying router security.

"The product itself might not be inherently unsecure, but it may enable you to operate in a non-secure way. So, unless password protection is the default setting, you could enable people to have communication paths that are not password protected, and that's just bad behavior by the end-user," he says.

Security practices might seem obvious, but the worry is that employees could become complacent when working from home away from the usual safeguards. Increased remote working raises new security considerations around authentication, secure networks, vulnerability to cyber attacks, and more.

"Inside these firms, IT security risk and compliance are key parts of that workflow, and internal policies are set up to take advantage of the fact that you've got things like building security, network security, desktop security—those things are all there. And suddenly, if you put people [in remote working environments], you need to start thinking about all those problems and how you're going to solve them," MarketAxess' Coltman says.

5G Adoption

The coronavirus pandemic has highlighted the importance of staying connected, both from a personal and a professional standpoint, relegating activities previously conducted largely in person—everything from work, school and meetings, to connecting with family and friends—to cyberspace. This sudden and monumental shift points to an increased appetite for higher-speed and higher-capacity 5G networks.

Current home Wi-Fi networks are subject to bandwidth-sharing with other household members, and internet connectivity and stability issues.

The hope is that 5G could alleviate some of those pain points in the near future, promising the delivery of high-performance and low-latency internet connectivity for both retail consumer and industrial use.

From a business continuity perspective, says Hinshaw, 5G could prove invaluable in ensuring workers can remain online and connected, as it purports to be more resilient than current 4G LTE networks.

As supply chains have halted, there is an expectation that the technology's broader rollout plans will be delayed. However, ETSI's Scrase says network operators are still on course to deploy widespread 5G coverage as soon as the third or fourth quarter of this year. This could be a crucial time as nations' efforts to re-open their economies run the risk of sparking new lockdowns.

"If we should, regrettably, end up with a second peak in a few months' time, it's quite likely that we will have 5G deployed by then, and we'll be in an even better situation to cope with increased traffic," he says. wt

On Cobol and Legacy Systems: Covid-19 Turmoil Calls for Change

Financial industry experts say the time to start future-proofing was yesterday. By Rebecca Natale

"LONG LIVE COBOL," wrote Wayne Linksman in a LinkedIn message. "It keeps me employed at 65 years old."

Linksman has been a senior Cobol programmer at Bank of America, where he worked on its credit card system. At Fidelity Investments, he assisted with application development and maintenance on its mutual fund accounting system, FIS InvestOne. And most recently he worked at Infosys, a consulting and IT services firm.

The Covid-19 pandemic has brought Cobol, a legacy programming language, back into the limelight in arguably the biggest way since its celebrated inception in 1959. This time, however, Cobol has a problem—or rather, there's a problem due to Cobol. First, it's big—but evidently, not too big to fail.

There are 240 billion lines of the code still in operation, and 5 billion more are added every year, reported *IBM Systems Magazine* in October 2019. According to a 2017 graphic by Reuters, 43% of banking systems are built on Cobol. The language underpins many of the legacy systems and mainframes used by large banks, corporations, and government agencies—most notably, at the moment, unemployment systems. As more than 20 million Americans filed for unemployment benefits in March, systems started to overload in some states.

Another problem with Cobol is its age. Though it has withstood the test of time—a remarkable feat in tech—the programmers who know it best are nearing retirement or have already aged out of the workforce. Additionally, college courses teaching it are few and far between. That means when things go wrong, there are fewer people who have the expertise to quickly fix the issues.

As of early April, IBM and the Linux Foundation jointly introduced three new programs: Calling All Cobol Programmers, which connects fluent coders to municipalities in need of help; Cobol Technical Forum, a temporary resource for experienced coders to provide free advice throughout the crisis; and Open Source Cobol Training, a new open-source training course that's available free on IBM's training platform.

The Covid-19 outbreak has brought forth a 100-year flood scenario, and almost no one was prepared. While some, like Linksman, are firmly positioned in the pro-Cobol camp, others are asking if the crisis is all the proof needed to start overwriting—and fast.

Digital Transformations: What's in a Name?

North of the US border sits a cautious Alex Benay, partner in digital and government solutions at KPMG Canada, and former chief information officer and deputy minister for the Government of Canada. Cobol-run systems piling high with Covid-19 measures are still working—albeit not perfectly—and more than 1,500 programmers have answered the call from IBM and Linux as of April 24, said a spokesperson for IBM.

Those are "amazing accomplishments," Benay tells *WatersTechnology*. "But the question still needs to be asked—did you just double down on a technical debt?"

Technical debt is a term used to describe the cost of repeatedly putting off system maintenance or upgrades, and the opportunity lost. It can swell and swell, but go largely undetected, until a sudden shock to the system has the power to break everything.

"[When the pandemic is over] I'm hoping we don't go back to the analog days. If we're going to stay digital, then this technical debt has to get looked at something fierce," says Benay, who you'll never hear using the word "transformation."

WatersTechnology has reported extensively on the digital transformation projects underway at institutions such as BNY Mellon, Northwestern Mutual, Bank of America, Brown Brothers Harriman, and many more. But if banks and tech companies are

really two birds of the same feather, Benay says such a concept shouldn't even exist.

"I think it's a load of crock," he says. "If you use that word, when are you ever going to be done? You're never done. If you're really a digital business—whether that's a bank or your government, it doesn't matter—you're never done."

Another who is familiar with the crossroads of government, finance, and technology is Matthew Van Buskirk, co-founder and co-CEO of Hummingbird Regtech, which specializes in anti-money laundering solutions. Van Buskirk has also been a bank examiner at the US Treasury Department, as well as director of compliance and regulatory affairs at Circle, a Boston-based fintech helping companies utilize stablecoins and public blockchains for payments and commerce.

"I have not seen any financial institution or government agency that I've interacted with that had what I would consider to be a good implementation of Cobol," he says.

Anecdotally, it's rare to find a bank that can definitively say how many customers it has. Some of the big banks Van Buskirk has worked with—he declines to name them—have as many as 10 core systems, especially those that have gone through mergers. As a result, those systems don't natively talk to one another, and the same person may be represented in multiple systems. The only solution is to run manual queries throughout each one.

Viral Shah, Julia Computing

> "[When the pandemic is over] I'm hoping we don't go back to the analog days. If we're going to stay digital, then this technical debt has to get looked at something fierce." **Alex Benay, KPMG**

In one Cobol implementation he has seen at a government agency, a database ran on a version of Cobol that could handle only capitalized text. If the agency produced a report, for example, and someone entered a sentence with both lowercase and capital letters, the output was 1,000 or so pages of unformatted, block text with no paragraph breaks. The solution was to send someone in and manually insert all the spaces on each report.

"I think we probably reached the point 10 years ago where we should have been ripping all this legacy stuff out," Van Buskirk says.

New Frontiers

The landscape for alternative programming languages is vast, with many specialized codes for specific use cases. Swift, for example, powers Apple iOS; Rust is ideal for embedded programming, such as for computer chips; Python is versatile, and suits areas like artificial intelligence and machine learning well, but isn't commonly found in game design and mobile apps, where Java and C++ shine.

Jason Tatton, a former algo trader from JP Morgan, recently developed a new language called Concurnas, meant to help financial services firms tackle common problems with concurrent programming, and having to switch between languages when moving from building to implementing a trading model. Taking an all-encompassing approach, Concurnas is open source and Java-based, and aimed at retaining the performance advantages of languages like Java and C++ with the easy syntax of Python.

Similar to Tatton, engineers Jeff Bezanson, Alan Edelman, Stefan Karpinski, and Viral Shah set out to combine the best of C, Matlab, Java, Ruby, Python, Perl and R in 2009—culminating in the programming language Julia, a potential solution to the so-called two-language problem, which happens when developers must write and rewrite a program in different languages.

Shah, co-founder and CEO of Julia Computing, says that to the extent you can keep an old system going, it's always worthwhile, as re-writing software is extensive, time-consuming, and introduces new bugs. When the system stops doing its job, it's time to kick it.

"If you're writing a new system today, it's important to think really carefully about the foundations on which you build your new system because that thing has to last for the next 30 years," Shah says.

While the open-source movement has taken off in the last decade—the Fintech Open Source Foundation (Finos), a nonprofit whose purpose is to drive the adoption of open-source software, standards and best practices in financial services, was founded in 2014—the fallout from the coronavirus outbreak is casting a harsh light on closed-source software and mainframe-based applications, used in instances such as bulk data processing and transaction processing. Open-source software is really the only way to ensure underlying code will be maintained for years to come, Shah says.

Additionally, the amount of data is growing exponentially. It was a data-driven world before the pandemic, and it will be even more so in the future. One day soon, the oldest systems will not be able to handle the influx. That will create not only operational issues but regulatory ones too. Certain fairness and lending regulations require banks to keep a trail of what data their algorithms touched and if and how they transformed it. Banks need to be able to prove their algos aren't biased, or giving fewer loans to minorities or women, for example.

"The amount of data is just too high. The old systems are simply not going to do that at this point," Shah says. "And they might as well embrace the new world and the new regulations with the new systems." wt

Geolocation Data Spotlights Covid Recovery

Hedge funds are using geolocation data to both spot signs of a pandemic recovery and to see its ripple-effect damages.
By Anthony Malakian

As the Covid-19 outbreak spread from February into March, it made sense that hospitals would face massive challenges around maintaining enough staff and equipment to handle an influx of patients. Still, it might have seemed antithetical that a global health crisis could be ruinous from a business perspective.

UBS' Evidence Lab has created a proprietary dataset that shows that for all hospitals reporting so far—17% of US hospitals—average surgical volume was down 26% in March 2020 compared to March 2019; emergency room visits were down 16%, and outpatient and inpatient discharges were down 11%. As procedures like endoscopies, colonoscopies, and bariatric surgeries are being delayed or canceled, hospitals are delaying capital expenditures, including robotic surgery, radiology, and mammography, according to UBS.

In England, the British Heart Foundation (BHF) said the number of people visiting emergency rooms in the country with heart attack symptoms "dropped from an average of around 300 per day at the beginning of March, to around 150 per day recorded by the end of March. A 50% drop is equivalent to approximately 5,000 of the expected people every month, or more than 1,100 people every week, with possible heart attack symptoms not being seen in emergency departments."

Hospitals depend on day-to-day procedures, elective surgeries, and, though macabre, admitting patients to emergency rooms. A hospital collapses, and it has a far-reaching ripple effect on its local community.

For hedge funds looking to monitor the health of hospitals, geolocation data—both GPS and satellite—can be used to monitor footfall traffic in and out their doors, including both workers who are there for longer stretches of time, and patients coming in and out for tests and procedures.

"Hospital bonds are an important part of the muni environment," Dean Barr, head of bespoke projects for alternative data provider Eagle Alpha, tells *Waters Technology*. "Since elective surgery is on hold, studying traffic back to these hospitals is important for bond pricing, default risk, and recovery rates. It is also the case that the community suffers since the largest employers in many communities are the hospitals."

A Delicate Blend

Buy-side firms are also analyzing footfall data to spot activity before any other lagging financial metrics, thus indicating a Covid-19 recovery, Barr says.

"Looking at an economy that's just completely shut down, the first thing you're going to want to look at is any information or service that can provide you with some sense of footfall. That footfall traffic, whether to a mall or a restaurant or a gym—to anything that has been previously shut down—can signal some form of restart, however small or large it is," he says.

Geolocation takes data from internet-enabled cars, cellphones, and computers, and connects that to an anonymized person. Geolocation data service providers often use a blend of satellite imagery, GPS data, Wi-Fi, and IP addresses or DNS activity coming from computers and phones connected to the internet, Barr says. Finding actionable insights in geolocation data can be difficult and there is no one "silver bullet" dataset; there's a certain blending of potentially multiple geolocation datasets along with other forms of alternative data, such as credit card, weather, sentiment, and/or payment data.

During a webinar on April 23, Jeremy Brunelli, head of Evidence Lab frameworks for UBS, showed how the bank is combining geolocation outputs to track the coronavirus recovery in China. For example, the evidence lab team took

the China Migration Network Traffic model, which primarily tracks mobile phone movements for Baidu users and shows people's movements into and out of cities and provinces in China, and they paired that with UBS Evidence Lab's Global Traffic Congestion Monitor, which takes in data from TomTom navigation systems to monitor traffic on a road or highway.

"Looking at the migration data, we saw a clear recovery out of the bottom in early February," Brunelli said. "It recovered in the March timeframe. It took a bit of a step down ... and then it settled down at a new plateau a bit below that original plateau."

For the broader Asia-Pacific region, they took the Congestion Monitor and combined it with the Global Public Transit Traffic Monitor, which takes data from the mobility app Moovit to see how people are using buses, trains and subways. Brunelli said it illustrated when Hong Kong and Australia were showing signs of a bottoming and then of improvement.

> "Hospital bonds are an important part of the muni environment. Since elective surgery is on hold, studying traffic back to these hospitals is important for bond pricing, default risk, and recovery rates. It is also the case that the community suffers since the largest employers in many communities are the hospitals."
> **Dean Barr, Eagle Alpha**

In the Amazon

Advan Research was started in 2015 to analyze geolocation data for hedge funds. Its CEO, Yiannis Tsiounis, says the vendor takes in about 6 billion data points per day from some 13 million cellphones and 1,000 cellphone apps.

Yiannis Tsiounis
Advan Research

Anyone with an app on their phone to which they have given permission to share data, the cellphone, even while resting in their pocket, periodically pings a cellphone tower. In the US, there are about 175 Amazon fulfillment centers or warehouses. Advan sees about 10,000 individual devices in those warehouses. If that device stays in the warehouse for four hours or more, they're assumed to be an employee.

Then, similar to how a Gallup poll is conducted—wherein around 1,000 people are surveyed, and that information is extrapolated to the entire US population—Advan takes information from those devices inside Amazon warehouses, compares it to its larger dataset of 13 million cellphones and to the broader US population to develop an estimate as to how many people are actually working inside an Amazon warehouse, as some people don't carry their cellphone, have it turned off, or don't share data.

Octavio Marenzi
Opimas

"The peak [of employees working in Amazon warehouses] has been as high or higher than [the December] holiday season, he says. "So Amazon has more daily employees now in their warehouses than they have at Christmas time."

Tsiounis also notes that the restaurant industry—which has been greatly hobbled due to closures and social distancing requirements—is down 89% year-over-year in the US.

"You know things are down, but you don't know how down they are—are they down 50%, 75%, 25%?" he says.

A Hard Dig

Octavio Marenzi, co-founder and CEO of research firm Opimas, says that geolocation data needs to be used as "a sanity check" on consumer and credit card data, as the two have a lot of noise, and only include about 1% to 2% of all the credit card transactions in the US.

In 2018, Marenzi wrote a report on the geolocation space. Back then, he estimated that by 2020, asset managers would spend about $250 million annually on mobile geolocation data. Marenzi today says that estimate was a little high.

"The thing with geolocation data is it does require a lot of calibration," he says. "It seems straightforward to say, 'I'd like to count how many people were in this location at this time, and I'd like to know how that's changing.' But when you start to do it, it becomes quite complicated because you're collecting the data based on app usage.

"While there's a lot of noise, credit card and payment data are easier-to-read signals in terms of spending," he says.

Geolocation is one of those alternative datasets that has a fair number of proponents and detractors. There are several hurdles to overcome before this data can be remotely useful. It's important to keep in mind that some phone operating systems and apps give location updates far more frequently (or infrequently, depending on how you look at it) than other operating systems and apps.

Additionally, cellphone tower triangulation is spotty, which affects GPS data. While GPS is the most accurate geolocation tracker, locating a device within three meters (almost 10 feet) can be impacted by terrain, buildings, and lack of service, according to Barr. And for satellite data, he says "the rule of thumb is that you use four out of six satellites to form a statistically reliable data panel."

As noted before, no single dataset is likely to deliver alpha; there's a blending with other datasets that needs to occur.

"Hedge funds, and especially quantitative hedge funds, are focused on point-in-time, time-series analysis. The first thing that you'll see when you look at this data is that there are big gaps," Barr says. "So if a hedge fund is using the raw data from the source—from the telcos or satellite imagery companies—the first thing they have to do is an enormous amount of data manipulation and cleansing in order to make sense of what the data is trying to say."

Lastly, there's a communication barrier that exists: often, hedge funds are not clear about exactly they're looking for. So they end up with a sea of data points, but no clear strategic direction.

"It's challenging," he says. "You have to know what you're doing." wt

Banks Eye More Open Source in Light of Covid-19

Driven by common industry pain points and unforeseen complications, capital markets firms have begun using open-source technology more widely. By Rebecca Natale

It was little more than a decade ago that former Goldman Sachs programmer Sergey Aleynikov was first prosecuted—and subsequently exonerated—on charges that he had stolen high-frequency trading code from the bank. At the time, the programmer countered that he was only trying to strip out open-source code that he had added, before returning it to the open-source community. Despite this, Aleynikov spent a year in jail before his conviction was reversed—only to have his conviction reinstated in 2015, and be exonerated for a second time in 2017.

How times have changed.

While open source was once considered taboo on Wall Street, it has become one of the capital markets' favorite toys. A number of factors—including ever-looming competition from Big Tech, common industry pain points, and unforeseen complications such as the coronavirus pandemic—have inspired sell-side firms to look at open-source technology in a new light.

"If the coronavirus has done anything in tech, it has put a microscope on the fact that those who are digitally advanced are advantaged," says Alejandra Villagra, global head of Citi Velocity, Citi's trading platform for foreign exchange (FX), cash and options. "We must connect to our clients [and] each other seamlessly. And overnight, that [was solved with] technology."

Gabriele Columbro, Finos

Citi has created one of three new open-source contributions made to the Fintech Open Source Foundation (Finos). The project, named DataHub, marks the bank's first open-source contribution to the foundation. The hub is a set of Python libraries dedicated to the production of synthetic data for use in tests, machine learning training, statistical analysis, and other related use cases.

DataHub stemmed from Citi's Engineering Excellence Program, an initiative that throws some of the bank's biggest, most intractable problems at its top talent, who try to come up with solutions, Villagra says. The engineering team built DataHub as Citi was seeking ways to anonymize its sensitive data when working with cloud providers.

Open source, says Villagra, is fundamentally about removing friction from trying to innovate in finance. Often, banks and large asset managers feel the same pressures, ask themselves the same questions, but aren't working on the same solutions. And while financial services firms have embraced the idea of consuming open-source code, she says, they are not as likely to contribute—and a one-way street won't do anymore.

Deutsche Bank is another tier-one bank that has strapped in for the open-source ride, having just unveiled its contribution to Finos, called Waltz. Primarily developed by the bank and Khartec, the project helps large financial institutions comprehend their IT architecture in a consistent, well-documented, and digestible format. Waltz shows where applications reside, what they do, and how they're connected. It has been used to assist with key performance metrics, data lineage, regulatory responses, as well as application rationalization and migration programs.

Russell Green, head of group architecture at Deutsche Bank, oversees thousands of applications and how they interact with one another. The IT landscape he's responsible for is no green pasture.

"Hundreds of thousands of interactions. Different technologies. Different geopolitical distributions. Different people using them. Different functionalities. When you multiply that by the complexity of these kinds of architectures, and these big systems and organizations, how do you ask simple questions of such a complicated landscape?" Green says. "Who's using which technology? Which system does risk management? Which one is deployed in this location? Which one's out of date on this piece of software?"

Though enterprise architecture tools and management platforms are available, Green says none are truly viable for behemoth institutions such as Deutsche Bank and its peers. He also sees potential for open source to make inroads into the regulatory space. For instance, Waltz could potentially help firms comply with the General Data Protection Regulation and BCBS 239—the Basel Committee on Banking Supervision's principles for risk data aggregation and risk reporting—if the

bank can standardize its approach in the industry to the regulators.

"We can start to speak as more of a single voice on how to solve these regulatory asks from different bodies, which are sometimes very loose," he says. "They have a principle, an idea, that they want us to be able to describe how our data gets from a system to a report, but it doesn't tell you what you have to do. So if we can collaborate as a group of people and respond to regulators in an open environment, we can save ourselves a lot of time and, hopefully, a lot of pain."

Counting the new contributions from Citi and Deutsche Bank, Finos platinum members—consisting mainly of major sell-side firms, with the exception of Symphony and GitHub—account for five of the past 14 open-source contributions to the foundation since early 2019, a significant increase. From mid-2018 to the end of 2019, 13.95% of projects were contributed by banks. For the comparable period of early 2019, that stat saw an increase of more than 20% of net new bank projects.

> "If the coronavirus has done anything in tech, it has put a microscope on the fact that those who are digitally advanced are advantaged."
> **Alejandra Villagra, Citi Velocity**

In addition to DataHub and Waltz, Goldman Sachs announced its Pure Alloy contribution for data modeling in November of last year, while JP Morgan has submitted two projects, Perspective for real-time data visualization and Cloud Service Certification for accelerating the development of a common set of controls and tests for cloud services.

Gabriele Columbro, Finos founder and executive director, says a big goal for the foundation is to bring on more buy-side firms as foundation members and have them also contribute their own projects. Goldman's Alloy has spawned some working groups with buy-side participants, using the project for different data modeling endeavors.

"Five years ago, open source was still seen as something almost like an unidentified object," Columbro says. "I think, for me, the main learning over the last three months has been that on one hand, open source has become an even more appealing vehicle to de-risk and neutralize the risk of especially large technology investments."

For banks, ready or not, the clock is ticking. wt

Trading Venues Face Resilience Test in Covid-19 Pandemic

Software testing and monitoring keeps market infrastructure a step ahead amid market volatility. By Joanna Wright

British author Terry Pratchett once wrote, "Million-to-one chances crop up nine times out of 10." In 2020, venue operators learned the truth of this maxim, as unprecedented market volatility met the unprecedented occurrence of billions of people made to work from home under lockdown orders.

The market infrastructure that remained steady through this period had robust software testing practices, says Laurence Rose, chairman and CEO of Omega ATS, an alternative trading system (ATS) that facilitates connectivity to major Canadian listed markets.

Several months ago in the North American markets, regulatory circuit breakers were triggered not once, but four times. "Imagine you have thousands of computers all interconnected, transferring many billions of dollars in value in securities all day long. And imagine saying, 'OK, now we have to hit the pause button and then resume operations 15 minutes later and hope that everything goes back to working properly.' And 'hope' really isn't a great word to use in this context. You have to ensure that your systems are architected and tested in a way that you know it's going to resume seamlessly," he says.

The first level at which circuit-breakers are triggered is when the S&P falls 7%. When that happens, market practitioners must halt trading, wait 15 minutes, and then resume, all together, and in coordination with regulators. To do that four times in the span of a few weeks, having not had to do it since the last crisis in 2008, was stressful, Rose says.

"Because it hadn't been tested in a production environment since December 2008, any venue that says that after they resumed everything they were 100% sure that it was all going to work perfectly is not being truthful," he says.

Every night after close, and every weekend in March, Omega ATS staff had to keep a close eye on the venue's systems to ensure they had the capacity to process the new levels of order flow coming in.

"This process involved ensuring that when we reviewed the order messaging and transaction activity, we determined any changes we needed to make in our system to ensure that if

those levels happened the next day, we were prepared for it," Rose says. "We were trying to stay one step ahead. So every time, for example, that we had additional order volumes in our system, we made sure that we had multiples of capacity to handle more than that level of volume for the next trading day."

All of this took place just after Omega ATS staff had gone into lockdown, with about 80% of the workforce at home. It was a perfect storm of unusual events that could not have been imagined before the era of Covid-19. It is possible, however, to prepare for the unimaginable, by testing the load that systems can handle, and combining those scenarios with others, such as servers going down.

This is the job of Exactpro Systems, a London-based company that specializes in functional and non-functional testing of systems that process wholesale financial products, of which Omega ATS is a customer. Exactpro has also done resilience testing and quality assurance for large clients like the London Stock Exchange and interdealer broker Tradition.

Paranoid Testing

Omega ATS and Exactpro have partnered on specific product implementations and are currently performing quality assurance on a matching engine that Omega will launch in the third quarter. The engine will offer midpoint trading, an order type the ATS has never provided before.

Exactpro CEO and co-founder Iosif Itkin says that from his vantage point, the systems that held up during this latest crisis were tested to a "paranoid degree," at levels more than double historical maximums. "In regulated markets, exchanges appeared to be adequately prepared, at least from what we observed, despite prior discussions [with clients]

that such levels of testing are unrealistic and not required. That is what people think until the crisis actually happens," he says.

Rose says in March, Omega took to testing at three times the volumes it expected to see.

"What you need to do is test for multiples of those types of volumes. So, for example, if during the height of the volume and volatility in March you were getting 10 million orders a day, you need to test for 30 million orders a day, or more. There was definitely a gap there based on historical levels, so we were prepared to handle the volumes that we were seeing, but we needed to up our testing and our capacity around testing by multiples because the baselines have changed now. The baselines for what we thought was this busiest day we could imagine actually tripled," Rose says.

Exactpro builds software to test the software of its clients. This includes injecting simulations of heavy market volume into exchanges' platforms to see if they can withstand the volatility. "Ideally, we put the simulators into the co-location environment so that the network topography is very close to the real market interaction because of the volume that comes into the exchanges from the co-location," Itkin says.

Exactpro conducts testing at paranoid levels to see at what exact point the system would not be able to tolerate more volume. In other words, Exactpro tests to see when—rather than if—a system will fail. This point for the majority of the market seems to be higher than that load experienced in March and April, Itkin says.

The company's testing software needs to be able to reproduce a real market event as accurately as possible. The injection of hundreds of thousands of transactions should not trigger the exchange's internal protective mechanisms, such as its own circuit-breakers or market surveillance systems—unless that is intended—because that will alter how the exchange's platform behaves and responds. In a real-life market event, volume is not evenly distributed over a long time; rather, a flash flood of orders will suddenly appear within seconds, or milliseconds. And the simulations must be deployed with as small a hardware footprint as possible, because in real life, there are thousands of servers connected to stock exchanges that split the load between them.

> "Because it hadn't been tested in a production environment since December 2008, any venue that says that after they resumed everything they were 100% sure that it was all going to work perfectly is not being truthful."
> **Laurence Rose, Omega ATS**

"When we do load testing, resilience testing, it's not possible to secure thousands of servers for the test, so [you] take limited hardware and then use it to simulate a huge wave of orders," Itkin says.

It's also important to simulate another, simultaneous event, as few outages historically have occurred due to a single factor. Let's say, for example, that an exchange is experiencing unexpectedly heavy volumes while at the same time, software updates in a production environment turn out to be incompatible with the servers that traders were using to access the system.

"We don't just test for different load levels; we need in parallel to kill various servers inside this system, and see that there is still no single point of failure," Itkin says. "Whatever we kill inside the system, there is a workaround, and the system will be able to switch to this workaround, and the server will die."

Itkin likens this approach to Netflix's interpretation of the concept of chaos engineering, which engineers at the streaming service have promoted as an approach to resilience. In 2012, Netflix released the source code for a tool called Chaos Monkey that tests the resilience of its infrastructure by randomly terminating virtual machine instances that run in production environments, testing how computers and humans respond. It's not possible to embrace this wholeheartedly in the highly regulated and systemically important market infrastructure world, but it's nonetheless useful, Itkin says.

Exactpro's testing software is written mainly in Java and Kotlin, apart from the software used for the load testing, which is in C++ because it is more efficient at simulating thousands of servers to which hypothetical brokers and traders are connected without the heavy hardware footprint. The hardware Exactpro uses depends on the client.

"Our clients use a variety of tools to achieve scale and resilience: InfiniBand, FPGA for low latency, and of course they use various servers and firewalls. Everything is duplicated [in testing] so there is no single point of failure," Itkin says.

He says that when testing for resilience in market infrastructure, software problems are more urgent than hardware problems. "Hardware will inevitably fail within large server farms. So it is necessary to keep reserve servers and network devices to accommodate for this event. But if something is wrong with the software, there could be a knock-on effect. If something kills software on a single server, there is a high degree of probability that the very same problem will kill any other server."

While Itkin remembers sleeping on the floors of exchanges in the early days—around 2010—of Exactpro, nowadays the company does this kind of testing remotely. The only time a human needs to be in the office is to simulate an event such as a cleaning staff member mistakenly pulling a power cord out of a wall, which happens occasionally.

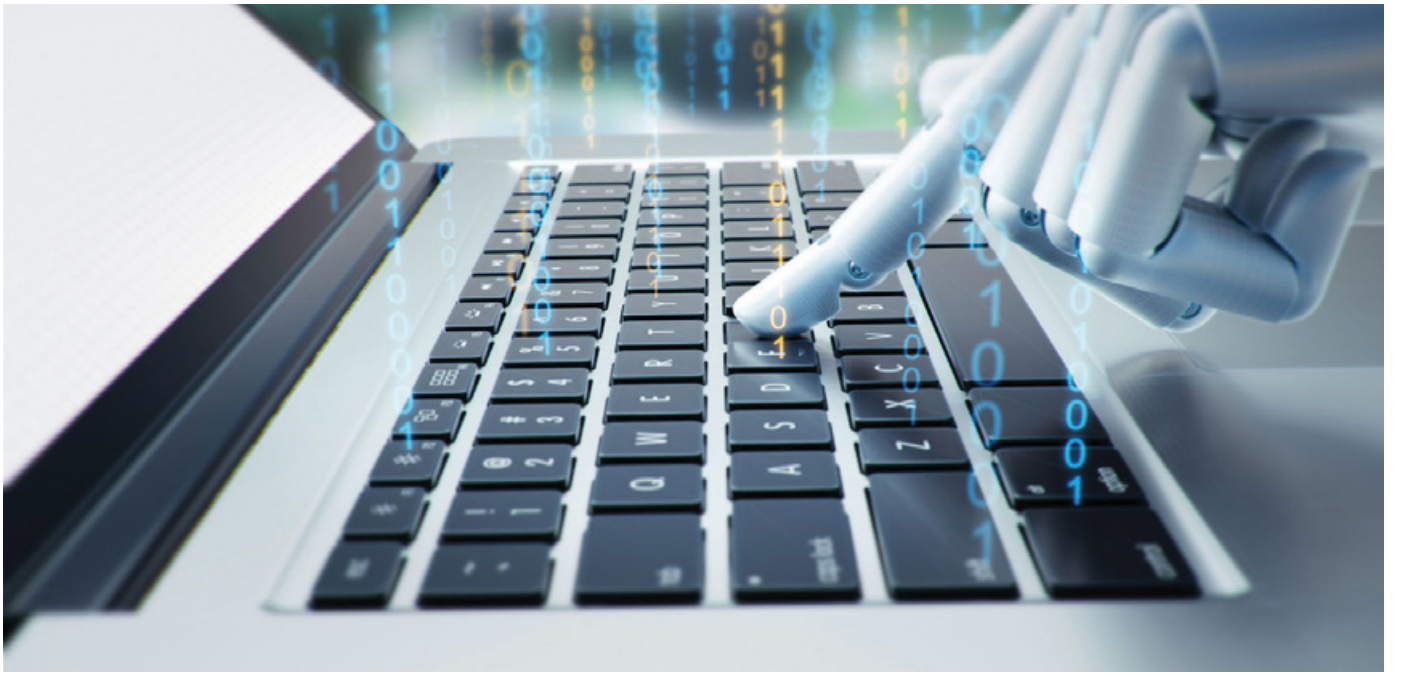
Itkin says companies should invest not just in testing, but also in ongoing monitoring systems with automated alerts. The recent volatility seems to have leveled out, but it was no black swan, he says—there will always be crises.

Rose says the recent crisis has sharpened Omega's focus on operational resilience going forward.

"If volume spikes to new highs, we are confident that we can handle it and deliver that resiliency for our clients. There is a new baseline for that now, but I think the crisis has made us focus on these areas and develop some new daily, weekly, and monthly procedures to ensure that we are always checking for these things," he says. wt

Covid Provides RPA a Chance to Shine, but Skeptics Remain

The pandemic has highlighted the need for greater automation, leaving some retail banks to embrace RPA, which could seep into the wholesale capital markets. By Hamad Ali



San Francisco-based Bank of the West, a regional subsidiary of BNP Paribas, recently found itself facing a significant increase in requests for payment deferments from its customers, as the economic impact of Covid-19 hit the US.

The wave of requests was more than the bank's current workforce could handle. But rather than go through the process of recruiting and training new personnel, it hired digital workers—a nascent buzzword for bots—to accelerate the processing of these urgent customer requests.

"The bots were developed in a matter of days, and they started handling the large influx of such transactions," says Shafi Yusuf, head of transformation and digitization at Bank of the West, BNP Paribas USA.

Shafi Yusuf
Bank of the West

Robotic process automation (RPA) has been around for decades, and is often confined to non-complex, repetitive tasks. During the coronavirus outbreak, RPA has proven more useful on the retail side of finance, but as is true with many technologies, once they're battle hardened on the retail side of the market, they often seep into the wholesale side.

Bots have received mixed reviews, with some users describing it as a great enabler of efficiency that helps to achieve resource reductions, while others warn of its fragility and advise firms not to replace a core platform with robots.

Senior bank executives have said that part of the problem is the word "robot," which evokes associations with helpful androids, creating unrealistic expectations. The pandemic, though, could shift the perception of digital workers in a significant way. Some feel it has already, while others remain more skeptical.

"I would say Covid-19 has changed the work culture in a matter of months, which would once have taken years to change, in terms of how things are done," Yusuf says.

He says once a robot is built and deployed, it only requires observation and monitoring. There is no need for human resource management, meaning it costs as little as a tenth of a human worker's salary.

"Bots, once developed and deployed, work unattended almost 24 hours a day with just some monitoring for upkeep, in case other systems cause any outages," Yusuf says. "They are usually a very low-maintenance digital workforce; they don't need any coffee to go on and on producing much higher output."

Santander Germany has been working with RPA since 2012. To improve the service, this work was centralized within the bank's OPS Digilab consumer operations services department at the end of 2018. Department head Michael Methner says there will be an acceleration of RPA in the banking space due to the pandemic.

"At the beginning of [the Covid-19 pandemic], it was very important to be creative and invent processes in a new way," he says. "We identified a lot of processes that could be more digital and more automated."

In April, Santander Germany announced a partnership with Roboyo, a company that consults on and implements RPA. Via the partnership, the bank is in the early stages of automating changes in customer data using a customized front end, with a back end automated with RPA technology vendor Blue Prism.

Methner says the project has improved service quality.

"The front end is doing all the checks, which normally need to be done manually in several screens and systems. After all the validations, the 'OK' is given and the RPA is running through the systems to change the data of the customer." He adds the organization now handles more requests with higher quality and in less time.

Jon Theuerkauf, chief customer officer at RPA specialist Blue Prism, says his company's banking industry clients have been able to better weather the impact of the pandemic because they have a platform of digital workers.

Jon Theuerkauf, Blue Prism

> "At the beginning of [the Covid-19 pandemic], it was very important to be creative and invent processes in a new way. We identified a lot of processes that could be more digital and more automated."
> **Michael Methner, Santander**

"The digital workers were the things that kept running for them in the midst of the human workforce being destabilized, having to be sent to homes, having to work full-time in remote locations," he says.

One of Blue Prism's clients is a large financial institution with large asset management and investment banking arms. It recently added 70 digital workers to help with cash management processes within the organizations. The firm, which already had over 1,000 digital workers, was able to build 70 more in three days.

"In a different time, they would have probably taken four or five weeks to build something like that," Theuerkauf says.

RPA: Not a Cure-All

RPA has limitations, and banks need to be aware of where it should not be used during the pandemic, Bank of the West's Yusuf says. One example is optical character recognition (OCR), a technology that converts images of typed or handwritten text into machine-readable text.

Yusuf says that in cases where there is complexity in variations in the documents, bots should not be used. His firm has trialed such technology, and Yusuf says the success rate has been much lower.

"RPA and adjacent automation tools are very reliable to handle structured and semi-structured data," he says. "However, if the information is unreliable and varies based on randomness in nature, then perhaps other tools like artificial intelligence and machine learning algorithms could be usable technologies.

Ed Wicks, head of trading at Legal & General Investment Management, says it is dangerous to use RPA for tasks with limited or zero-tolerance for errors. While RPA can produce clean results, it will only accomplish that for very specific tasks.

"Rules-based algorithms would be a safer choice," for more complex needs. "Other tasks that are not supported by the availability of reliable data should also be avoided," he says.

Wicks says when the outcome of some repetitive tasks can be statistically optimized with the support of data, RPA will have greater benefits. "The automation in the selection of an execution channel or the macro-management of low-touch trades would benefit from greater use of RPA," he says.

And there are hidden costs associated with RPA. Ulrik Modigh, head of product and operations at Nordea Asset Management, has previously said that his firm's experiences with RPA delivered "limited success." The Nordic heavyweight applied the technology to a number of use cases but reaped little return compared to the cost of implementing the pilots and fixing technical issues.

"I think the gains that we saw were too small, and there was also a lot of investment that we had to make to keep the process up and running," Modigh said.

It's a sentiment that has been said previously by industry technologists. Says one senior manager at a vendor company that specializes in AI, "RPA is a glorified workflow tool. I use RPA because I was too lazy to set up the workflow myself. And it's not even necessarily cheap, because I have to upgrade that robot every time. It's not the answer."

So the jury is still out, but it's clear that if more people are going to work remotely in a post-Covid world, RPA is primed to take on greater importance. And as the retail side of finance works out the kinks, the institutional side will likely take greater notice. wt

Max Bowie

Location, Location, Relocation

It's technology that has helped firms continue working seamlessly through the outbreak, and Max says this same technology will keep the markets running smoothly—and remotely—in the future.

Are you sitting comfortably? Good, because you might be there a lot longer.

Despite many businesses—including financial firms and exchanges—reopening for business, coronavirus cases continue to rise, and precautionary measures are likely to be in place for the foreseeable future.

The result is that many individuals who can work from home are opting to continue doing so, and for the most part, their employers are supporting this choice and implementing longer-term work-from-home strategies. At the same time, their suppliers are re-engineering their products to support compliance from the kitchen table and best execution from the bathroom.

Until now, most changes to working practices have been undertaken with the assumption of a speedy return to "normal." But in the absence of a Covid-19 vaccine, a full-on return to traditional work environments is by no means certain anytime soon. Aside from professionals' understandable concerns for their own health—and the health of others they come into contact with—there are practical matters that would make returning to office spaces problematic, to say the least. Socially distanced desk space will make it more expensive to accommodate all employees, while limiting the number of people who can ride in an elevator at once could dramatically increase the time it takes staff to get in and out of their offices.

In some cases, these measures make returning to work at best inconvenient, or at worst, impractical. In others, it's simply impossible to resume in the same manner, so financial markets are recreating familiar scenarios using technology—and we're not just talking about holding meetings via Zoom.

It's the (Virtual) Pits

For example, Cboe Global Markets, which closed its open-outcry trading floor in March to slow the spread of the Covid-19 virus, before reopening it in June, is still evaluating other options to maintain its operations, given that the exchange may decide to close its floor temporarily again for this or other reasons. In a June 12 filing with the Securities and Exchange Commission, Cboe proposed a rule change that would allow it to address some of the shortfalls of purely electronic trading for instruments that typically trade on a hybrid model.

> Where a financial professional is physically located is less important than ever before.

The filing proposes an "audio and video communication program" that, along with a chat capability, would create a "virtual trading floor" comprised of "virtual trading pits" for specific options asset classes. Participants in each pit would be able to see who is present, and communicate with other participants to allow "the same communication capabilities TPHs [Trading Permit Holders] generally have on the physical trading floor so that they may conduct open outcry trading on the virtual floor in the same manner as they do on the physical trading floor."

Meanwhile, in its physical pits, the exchange will modify the space available to maintain distancing between participants. This would mean fewer trading spots, which should encourage participation in the virtual pits.

The result is that where a financial professional is physically located is less important than ever before, while technology makes it easier than ever for firms and employees to operate effectively when working remotely.

Just a decade ago, it became less important where a firm's internal IT was located so long as its trading servers were co-located in the same datacenter as their main trading markets. Similarly, employees and their functions could now be spread throughout a city, state, country, or the world.

During the Covid pandemic, for example, Northern Trust has been using technology from Boston-based Enlighten Software to identify capacity within its workforce around the world and shift tasks between staff in different locations, depending on their workload and availability.

And while firms will still need physical locations, it's increasingly evident that participating in—or serving—the global financial markets no longer requires companies to cluster around traditional market centers. And if markets do become even more decentralized, then one lasting impact of the coronavirus may be how it literally redraws the map of financial markets. wt

Navigating the New Normal

As companies try to get their people back into the office, Wei-Shen explains why that process will be a slow one and why empathy will be needed.

Social media can be a cesspool even during the best of times. But during the Covid-19 pandemic, it seemed more like an abyss. If it isn't the general, saturated aura of misery one day, it's some holier-than-thou stranger you've never met describing in vivid detail all the things they're positive are wrong with you, and so on.

Who needs it? Each of us deals with tough situations differently. We all have our own thought processes and means of coping with pain, anxiety, and uncertainty. Do we try to be better? I sure hope so, but at the same time, that doesn't give others the right to tell you, unsolicited, how you should face the situation at hand.

As I write this, Hong Kong is going through its third wave of the pandemic. At the end of April, during a company video conference call, I was given the opportunity to tell my London and New York colleagues what an easing of the lockdown could look like, as our restaurants and stores were still largely open, and were subject to limited restrictions compared to some Western nations.

Back then, Hong Kong was blessed to have about a week of zero new cases, while cases in London and New York were shooting upward. I told my colleagues that we just have to keep pushing through, take extra precautions, and slowly, the city will start to reopen, and we can go back to some sort of normalcy.

Now that Hong Kong is facing its third wave, it's starting to break some psyches. It's currently the middle of summer in Hong Kong, and that means average temperatures of 32 degrees Celsius (that's 90 degrees Fahrenheit for my American friends), and humidity levels are at about 50%. That's what many would call perfect beach weather.

Well, that was before the Hong Kong government put in new measures to help curb this third wave. Now, the beaches are off limits, face masks are mandatory (not particularly a problem in Hong Kong), and there's a ban on gatherings of more than two people. Anyone disobeying these measures could face a fine of HK$2,000 (US$258). I'm not sure about you, but that's money I'm not willing to throw out the window.

> We can't forget about the people—our colleagues and friends, the people that make waking up early, smooshing into a crowded train car, and going into an office something of a treat.

When you take a global pandemic, mix in what feels like economic doom, and top it with all the other things in the world to be scared and outraged by… well, that's not a dish I want to eat.

Please forgive this rant—it's part of my process as I try to find the bright lights again. And I think that's the important takeaway: finding the good in the world—in life—is a journey.

An Unknown Tomorrow

Every story in this issue of *WatersTechnology* focuses on the effects of the coronavirus on the capital markets, but the point that I'm trying to make here is that we can't forget about the people—our colleagues and friends, the people that make waking up early, smooshing into a crowded train car, and going into an office something of a treat.

I know I'm not alone in believing there will be a new normal, but what that normal will look like is anyone's guess. And when it will materialize is also unknowable at this point. Everyone hopes a vaccine will be ready before the end of the year, but right now that's just a wish, not science. Currently, the fastest vaccine ever arrived at was for mumps, which took four years of research and development, and, undoubtedly, trial and error. Then, as if to make matters even more uncertain, viruses mutate, and there's no way of knowing what the next pandemic might look like, or how soon it might follow this one.

These thoughts easily come flooding in, and it can be tough to close those gates. But it's important to remember that as we try and move back to a more normal office environment, it's going to take time to get everyone on the same page, so empathy will be required.

And who knows? If we can all find that empathy, and *that* becomes the new normal, maybe the future will be even brighter than those halcyon days before the pandemic. wt

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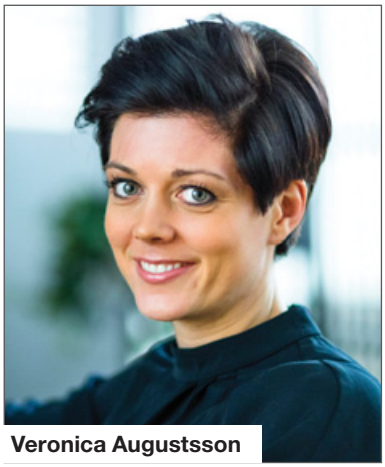
Human Capital

Veronica Augustsson Joins Doconomy as Board Chairman

Veronica Augustsson, former CEO of Stockholm-based Cinnober Financial Technology (now a subsidiary of Nasdaq), has joined fintech company Doconomy as chairman of the board.

Doconomy helps track and measure companies' carbon footprints.

Augustsson is a founding partner of 7Ridge, a growth equity firm that invests in technology enabled financial services. She spent much of her working life at Cinnober, having joined the firm in 2002 as a developer. Between 2012 and 2018 she was the company's CEO.



Veronica Augustsson

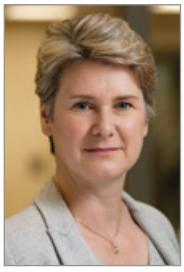
IHS Markit Hires Ex-CME Exec to Head Americas Reporting

IHS Markit has hired Igor Kaplun as executive director of MarkitSERV's integrated reporting business, responsible for leading the expansion of the vendor's regulatory reporting capabilities in the Americas.

Kaplun previously spent almost 11 years at CME Group, most recently as director of its global repository services.

Based in Chicago, Kaplun reports to Struan Lloyd, executive director of MarkitSERV, who also recently joined the vendor from CME, where he was head of global repository services for Asia-Pacific.

Igor Kaplun



Elly Hardwick

Ashley Daffin

Elly Hardwick Joins Itiviti Board

Itiviti has appointed Elly Hardwick to its board of directors.

In her 25-year career, Hardwick has held several senior roles, including chief digital officer at UBS and head of innovation at Deutsche Bank. Between 2012 and 2016, she was CEO of fintech startup Credit Benchmark.

Hardwick is also a non-executive director at Axis Capital and Alpha Bank.

Eventus Systems Taps Joseph Schifano for Regulatory Affairs

Eventus Systems, a trade surveillance and risk management software platform provider, has hired Joseph Schifano as global head of regulatory affairs. In the new role, Schifano will partner with key client stakeholders to assess their experience and generate ideas for new functionality and products.

Schifano is an attorney specializing in market surveillance, most recently as deputy general counsel and chief compliance officer at Tower Research Capital in New York, which he joined in 2014.

He is based in New York and reports to Eventus president Jeff Bell.

The firm has also hired Mikhail Gasiorowski as North American sales director, and Diane Imas as director of marketing.

Hudson Fintech Hires Director of Strategic Development

Hudson Fintech has named Ashley Daffin as director of strategic development. Daffin has worked in the capital markets for 30 years, while holding institutional sales roles at HSBC, NYSE, and Refinitiv, as well as working with a variety of startups on business development. He is also chair of the education committee at financial markets association ACI UK.

The vendor has also hired Martin Best as head of business development. Best has worked in senior sales and relationship management roles for more than three decades, including fixed income sales at Alpha Bank, Danske Bank, LBBW, and, most recently, Rabobank.

Beeks-Velocimetrics Announces Matthew Cretney as Head of Product Management

Matthew Cretney has joined Beeks Financial Cloud and Velocimetrics as head of product management.

Cretney brings decades of experience working in fintech and infrastructure, mostly at Thomson Reuters/Refinitiv, where he was the technical product lead for its SaaS-based FX eTrading platform and oversaw the development of Refinitiv's FX spot and forwards matching services.

Etrading Announces David Lane as Technical Operations Officer

Etrading Software has hired David Lane as technical operations officer. In the new role, he will help develop and roll out technology solutions at the institutional level.

Lane, who previously worked at NatWest Markets and RBS, has recent experience in supporting financial firms in technology strategy, governance, and risk frameworks, primarily in association with cloud migrations.

Etrading has also hired Will Palmer as chief information security officer. He is tasked with building a company-wide security strategy for the firm, and brings more than 25 years' experience in financial services IT in London and Asia.

Lastly, James Haskell is joining Etrading as business operations officer, with oversight of the day-to-day operational running of the firm's managed service products. He has more than 20 years' experience in financial services and operations, including more than 13 years at Goldman Sachs.

Regis-TR UK Taps John Kernan for Leadership Role

Regis-TR UK has appointed John Kernan to its board of directors and made him chief executive.

Kernan has been the company's chief operating officer since April 2019, and part of the executive management team since 2014. He retains his mandate for business product management and business development, reporting to managing director Irene Mermigidis.

Kernan previously held senior roles at State Street International Ireland and Deutsche Bank.

Andrea French Named Interim CEO at Enterprai

London-based research and technology startup Enterprai has appointed Andrea French as interim CEO.

French will be responsible for navigating the regulatory and commercial considerations of the firm's partners, vendors, and key clients. Previously, she was co-CEO and COO of Rokos Capital Management, and was former partner and COO of trading at Brevan Howard.

MetricStream Installs Bruce Dahlgren as CEO

Bruce Dahlgren has joined enterprise cloud applications provider MetricStream as CEO.

RSTOR HIRES MICHAEL HEPBURN AS SENIOR SALES HEAD

Michael Hepburn

Trading systems sales veteran Michael Hepburn has joined cloud data storage provider RStor as senior sales director in London.

As the company's first UK-based salesperson, Hepburn will be responsible for expanding the European client base for RStor's data storage offering, and building a sales team of 15 people for Europe, the Middle East and Africa within a year.

Hepburn was previously regional vice president for Europe, the Middle East and Africa at Quantum Metric, a digital customer experience platform provider.

At RStor, he reports to chief revenue officer Paul Buttle.

David Lane

Craig Trim

Dahlgren previously served as CEO of a Trivest portfolio company. He has also worked at Kony, a cloud-based enterprise application and mobility solutions provider, and spent over 10 years at HP and Hewlett Packard Enterprise.

Andy Diggelmann, interim CEO and CTO, and Gaurav Kapoor, COO, who together had formed the office of the CEO, will continue in senior leadership roles to support Dahlgren.

Casuality Link Names Craig Trim Senior Software Engineer

Causality Link has hired Craig Trim as senior software engineer for NLP. In the new role, Trim will work on enhancing the firm's AI-based offering, Research Assistant.

Trim previously worked at IBM, where he has spent most of his career, most recently as senior managing consultant.

He was also chief technology officer at cognitive computing company Dristi.

David Toomey-Wilson Joins AlgoDynamix as Sales Head

AlgoDynamix has hired David Toomey-Wilson as national sales director for the Americas and specialist representatives in Singapore, Thailand, and Indonesia.

Toomey-Wilson will aim to expand the firm's footprint in the Americas.

Previously, he worked at SimCorp Gain as head of data management sales for the Americas. He has also worked at Bloomberg PolarLake as vice president of sales.

Peak6 Hires Aarti Kotak for Advisor Role

Investing and technology firm Peak6 has named Aarti Kotak chief strategy and operations advisor.

Kotak will provide strategic and operational leadership to Peak6.

She is an attorney with nearly 20 years of experience in economic development, public policy and public-private finance. Most recently, she served as deputy chief of staff for neighborhood economic development in the office of Mayor Rahm Emanuel.

She reports to COO Judi Hart.

BTIG Names Luke Hodges COO

BTIG has hired Luke Hodges as COO and head of equities.

Hodges will be based in BTIG's London office and will be tasked with developing the firm's strategy, recruiting key talent, and investing in technology to bolster its trading platform and product suite.

He previously spent more than 17 years at Goldman Sachs, where he ran several businesses across Europe, the Middle East and Africa, including portfolio trading, ETF trading, listed derivatives and electronic trading. wt

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