FinTech Trends 2018: How Technology is Rewriting the Capital Markets

Seven advanced technologies will converge to improve performance
Foreword

Nasdaq has been at the forefront of financial technology since our inception back in 1971 when we launched the world’s first electronic stock exchange. Today, we hold innovation in the same high regard, though our approach now has the benefit of nearly five decades of experience and an abundance of technologies we had been dreaming of back in those early days.

Recent advances in technologies such as blockchain, cloud computing, machine intelligence, behavioral science, and other areas provide us with the opportunity to literally rewrite tomorrow and drive our industry forward in entirely new ways. Indeed, Nasdaq has adopted a new strategic positioning with this future in mind, prioritizing businesses like market technology and information services that provide the greatest opportunities for growth.

The environment in which we operate lends itself to these priorities and can best be understood by examining four key trends:

• First is the development of the marketplace economy, an evolution in the purchase and sale of non-financial assets using market mechanisms that allow for real-time negotiation on price. These mechanisms represent the backbone of our exchange business and their application outside of the capital markets is very exciting.

• The second trend we see is investment banks demonstrating a real interest in working with partners like Nasdaq to develop new technologies that can drive their businesses into the future.

• Third, it is impossible to overlook the explosion in available data of all types, which combined with advances in machine learning create myriad opportunities in market surveillance, data analytics and in the capital markets themselves.

• Finally, investment management has become increasingly competitive with a strong focus on technology-powered areas including the shift to passive from active investing and the growth of quantitative strategies. Here, again, innovation is at a premium.

Given the importance of technology to our industry and the opportunities presented by these long-term trends, we are pleased to offer you Nasdaq’s view on the current state of financial technology. Below, you will find our latest thinking on the major innovations we see both now and in the years to come. At Nasdaq, we work with these technologies and developments every day. They energize us and keep us focused on our path forward into an exciting future.
Cloud technology is maturing, and adoption is accelerating.

A couple years ago, mainly smaller firms and innovative startups utilized the cloud because of its potential to save costs, increase agility and accelerate time to market. But the technology has matured to a point where even the largest financial firms are embracing it, too. In fact, they realize that if they do not invest in it, they are going to be left behind by startups. In addition, the cloud providers are working with the authorities and firms to remove regulatory roadblocks and improve performance to meet financial industry needs.

A wide range of workloads – even critical ones that are highly-regulated – are already being shifted. The U.S. is leading in cloud adoption, but other regions are following and will likely catch up in two or three years.

Each company’s cloud adoption journey will be different depending on their legacy technology. Mainframes, for example, are difficult to move to the cloud.

Nasdaq has a varied cloud landscape and several workloads have already been shifted. Global Transaction & Market Services has been running critical systems in the cloud since 2014, for example. New applications are cloud native and designed for dynamic scaling.

The Nasdaq Financial Framework we’ve created is a strategic shift. We are re-architecting and reinventing the market-powering technology stack and migrating to cloud-native markets that run anywhere utilizing private, public and hybrid clouds and a modern, containerized micro-service architecture. Our Corporate Solutions business is perhaps the farthest along in cloud usage with its suite of web mobile-based applications designed to help customers enter public markets more successfully.

We expect that hybrid cloud will be part of the journey for many organizations. Some workloads, especially latency-sensitive ones, will remain on premises or in a private cloud, but most will be moved to a public cloud over time. Companies will continue to modernize by using containerization technologies and the run anywhere model. Nasdaq is committed to working with customers along their cloud journey, regardless of where they choose to run or which cloud provider they select.

Machine Intelligence is permanently reshaping the capital markets.

Firms are hunting for an edge in the market. Instead of just relying on market data for price discovery, they are focusing on the factors that influence price movements.

Today, 80% of the world’s data is unstructured, according to Gartner Group. Yet, trading algorithms need structured data to achieve good results. Advancements in machine intelligence technology are allowing us to structure new, unstructured datasets – drastically expanding the types of datasets that can be used for making trading decisions. This paradigm is creating an alternative data revolution, which is rapidly spreading across the industry.

Machine intelligence – combined with low cloud costs, the Internet of Things, big data analytics and alternative datasets – is empowering firms to develop innovative ways to understand the factors that support companies’ financial health.

Moreover, machine intelligence is being deployed in surveillance to ensure market integrity. Given the nature of the reviews performed and the vast data sets that must be digested for proper analysis, the technology allows illicit activities to be detected more effectively than classical, rules-based engines can do alone.

At Nasdaq, one application is to perform quality assurance by identifying outliers in how certain situations have been handled during investigations. Leveraging machine intelligence in our SMARTS technology, an algorithm scores incoming alerts based on the likelihood that the alert will lead an analyst to take further action. The random and event-based selections of alerts for managerial review have been complemented by outliers – where actions taken by analysts have differed from predictions by the algorithms. This provides samples with a much higher level of relevance in terms of signaling potential problems.

Overall, we anticipate that the use of machine intelligence in the financial services industry will grow as firms invest in it and explore specific use cases.
Behavioral science is adding another layer of sophistication to investigations.

Behavior encompasses physical, psychological, anthropological, sociological and economic factors. It is a voluntary response, controlled by the brain, to an internal or external event. Moreover, it can be measured, and it varies between organizations. For example, behavior in a two-man hedge fund may be completely different to behavior at an asset management company with trillions of dollars under management. The key is using methods from behavioral science to understand the layers within the organization, and then design processes and technology to improve performance.

We believe we are one of the early adopters in leveraging behavioral science methods. Our unique Behavioral Insights Platform uses human factors and cognitive analysis to capture and program certain features into machine learning and AI algorithms, as well as to design both workflow and intuitive user interfaces. Buy-side customers are gaining insight into their portfolio managers’ performance, and also setting a baseline for their normal behavior and heat scoring it for compliance purposes.

User Behavior Analytics (UBA) is deployed in our security sites to look for anomalies in activity, which then may be investigated by human analysts. UBA speeds security investigations significantly and drives massive efficiencies in data gathering and analysis across teams.

Behavioral science, machine learning and AI is a powerful combination. Over the next year, we are looking forward to pulling in more datasets and turning them into actionable intelligence that can be used in various investigative processes, as well as strategic decision making.

Blockchain is moving toward commercial applications.

Most major financial institutions and many smaller ones alike have been working on blockchain proof of concept projects either through a consortium or by going solo. As an immutable record of transactions and digitized asset ownership in a peer-to-peer framework, the technology has tremendous potential to increase efficiency, reduce errors, decrease settlement times and save costs.

Nasdaq has already run successful blockchain projects and pilots with our implementation at the Nasdaq Private Market (NPM) and with the eVoting solution in Estonia. The Nasdaq Financial Framework is already blockchain-enabled, and we are delivering products and market solutions to customers including the New York Interactive Advertising Exchange (NYIAX) and to SIX Group in Switzerland and the South African CSD, Strate, in the future.

Recently, we teamed up with Reality Shares to launch a new product called Reality Shares Nasdaq Blockchain Economy Index, a smart-beta index designed to capture the growth of blockchain technology. We have also listed CoinShares’ exchange-traded notes consisting of Bitcoins and Ethers on Nasdaq Stockholm.

During 2017, several parties in the financial services industry moved from the proof of concept phase into pilots and building of commercial applications. We expect that progression to continue during 2018, with use cases of various sizes put into production with the objective to scale their solutions over the coming years.

We anticipate more activity in the crypto-asset space with the launch of futures contracts and other instruments traded on regulated exchanges. New ventures are already using initial coin offerings (ICOs) and token issuances for fundraising and for launching new crypto assets. Some central banks have set up research units to investigate the introduction of a cryptocurrency linked to their fiat currency, although the Bank of England recently canceled its plans. Moreover, it may be possible to develop a settlement coin that can be transferred via a blockchain.

Currently, the live, private blockchain use cases focus on a particular function and are limited to a couple of nodes, but networks will start to expand to include more counterparties during 2018. Eventually, there will be moves to enable blockchains to interact with one another. The end goal is for parties to collaborate and set up commercial networks or consortia based on blockchain where they share infrastructure, although this process will take time.
Pari-mutuel technology could be applied to create exciting new products in financial and non-financial markets.

Bilateral trading is not necessarily the best model for products that do not have an underlying security or asset with a liquid market because it is not always possible to find a counterparty. In such cases, it may be possible to deploy a sophisticated pari-mutuel or pool-based model, which deconstructs events into tens or hundreds of thousands of outcomes and matches everyone’s order against a pool. There is no need for bilateral matches as long as there is a diversity of sentiment regarding the movement of that product. One of the benefits of this model is it allows people to place orders that result in customized positions.

Currently, the Hong Kong Jockey Club uses the pari-mutuel model to offer a wider range of bet types, a richer display of odds data, and bigger pools with more stable odds. Tabcorp in Australia plans to launch it in 2018 as well.

During 2018, Nasdaq will continue to explore use cases in the financial markets, perhaps to trade customized options on indices and economic statistics, for example. Moreover, we see the potential to deploy this model in non-financial marketplaces that focus on event tickets and insurance. This is an example of where the convergence of technologies can enable markets everywhere.

Cybersecurity requires constant vigilance, a culture of security, rigorous employee training, strong cyber hygiene, and advanced solutions.

Cyberattacks are a common occurrence nowadays, and they inevitably result in financial loss and reputational damage. It has become such a problem that cybersecurity has been elevated to the board level. While companies want to strive for a perfect track record, achieving it is both difficult and expensive.

As a regulated entities, financial firms always have been required to adopt due care whenever handling information. They tend to have a holistic security program and a charter that is signed by the board, and the program is then implemented throughout the organization.

Security is everyone’s responsibility, and to develop a culture of security, training within an organization must be enhanced continuously. Firms also collect various logs of network and system traffic, but it is impossible for humans to sort through all of those messages. To illustrate, the data exceeds 30,000 messages a second at Nasdaq. Therefore, firms have deployed technology that can do it much faster and more efficiently so analysts can concentrate on high priority alerts.

Traditional anti-virus is becoming less useful, but firms are increasingly using other methods such as white listing of applications. Software is available to white list the applications that should be on employees’ PCs and prevent people from clicking on malware. If someone inadvertently clicks on an application, the white list will verify whether it should be there or not. Other types of technology can be used to thwart general network attacks such as phishing, which is a common method used to get into an environment.

Machine learning and AI can help firms cope with increasing volumes of security data. AI can be used to detect anomalies once a baseline has been established for individual users, applications and network traffic. Networks change constantly, so anomalies could be normal activity, but then again, they could be an attacker or a compromised machine. Further, firms can leverage AI and behavior analysis to detect insider threats - such as when someone within the organization takes data and publishes it on the internet.

We have deployed all of these technologies at Nasdaq, and we remain on the lookout for emerging technologies that will enhance our security.
Quantum computing could completely change the trading landscape, but the timeframe is uncertain.

Quantum computing is an emerging technology being developed by universities such as MIT and University of Rochester, as well as several major technology titans. We are keen to determine how to apply this technology to service the financial services industry. Quantum computers are good at optimization and performing intensive calculations, such as Monte Carlo simulations and Black-Scholes option pricing, that traditionally have been run overnight. Because quantum computers can process some algorithms much faster than classical computers, they could completely change the landscape with respect to how trading decisions are made. They are also very good at searching, and from an exchange perspective, they could be used to quickly match buyers and sellers. These use cases could be transformative, but the timeframe for general release is uncertain.

These machines are not going to be cheap when they first come out, so nation-states could be the first to obtain them. There are concerns that if a rogue nation-state builds a large qubit quantum computer, then much of the cryptography as it exists today is at risk. Others have asserted that quantum computing could create new, unbreakable mechanisms for encryption.

Cloud providers are beginning to make quantum computing facilities commercially available as part of their service offerings, thereby making the technology available at an affordable price point. These offerings use a hybrid model allowing certain pieces of a problem to be addressed by classical computers while others that are best served by quantum computing algorithms can be handled by quantum computers.

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It is very early days for this technology, but Nasdaq will continue exploring the opportunities it presents and work with our partners to find potential applications.

Conclusion

Financial firms are leveraging innovative and potentially disruptive technologies to improve efficiency, reduce costs, increase security, enhance revenue and facilitate regulatory compliance. Many of them are already building cloud, machine learning and AI, blockchain and cybersecurity technology into their strategy. They are actively participating in industry working groups to figure out how they can make the best use of technology, and ensure their implementations comply with regulations. Moreover, they are following developments in emerging technologies such as behavioral analytics and quantum computing with a view to implementing them when and if it makes sense. It is fascinating to watch these technologies converge into the solution for the future.

In 2018, we will continue to roll out the Nasdaq Financial Framework. We are evolving our core products that are already running at over 100 marketplaces globally into a new suite of business applications. Built to accommodate continuous change and technology advancement, we have created capsulation layers within the framework that serve as an interface to these emerging technologies, and ensure we can continue to be at the industry forefront. Additionally, as we build with the customer in mind, we look forward to continued partnership with market participants, issuers, regulators and other technology companies and encourage collaboration with all parties to create a stronger, more efficient and transparent capital market ecosystem ready for change.

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