Algorithmic trading: why now?

By Jeff Brown, Director of Product Development, UNX, Inc.

Algorithmic trading – the search for automated trading efficiency – represents the intersection of revolutionary trading technology, buy-side trader sophistication, market regulation, and economic and competitive demands. The ongoing development of these trends promises that what the marketplace is offering today is only a prelude to what we should expect in the future.

Not revolutionary but evolutionary

Given the recent proliferation of algorithmic trading products on Wall Street and the attention that these products have received from traders, analysts, and the media, it may seem as if we are witnessing a veritable revolution in trading. Algorithmic trading as a concept and application is neither new nor revolutionary. Rather, it is the result of an evolutionary process at work for decades. The primary drivers of this evolution are:

1) the growth in quantitative trading and risk management techniques on Wall Street;
2) the industry's relentless drive for efficiency through automation; and
3) advancements in technological infrastructure.

Quantitative trading

If one were to identify a single "Big Bang" event – the seminal moment in the history of algorithmic trading – it would likely be the publication of the Black/Scholes Option Pricing Model in 1973. This model laid out a quantitatively rigorous method for pricing options contracts by tying their value to that of the underlying equity security, and identified ways that arbitrageurs could profit from minor discrepancies in the pricing of related instruments.

Wall Street traders applied similar quantitative techniques to index and statistical arbitrage, and throughout the 1980s and 1990s, program trading desks sprang up all over the Street to focus on these strategies.

And despite some setbacks – notably the 1987 stock market crash and the 1998 collapse of Long Term Capital Management – the trend toward ever more quantitative trading has continued unabated.

Likewise, the buy-side, has sought increasingly quantitative methods for measuring their trading costs, managing risk, and assessing portfolio attribution. From a trading perspective, a variety of benchmarks, such as VWAP and Implementation Shortfall, have been devised to measure implementation costs, and vendors can now deliver not only historical but real-time and even predictive transaction cost tools.

Efficiency through automation

A second major driver of algorithmic trading has been the steady march of automation in the asset management and brokerage industries. Portfolio and order management systems have automated the handling of paper order tickets. The widespread adoption of the FIX (Financial Information Exchange) communication protocol has automated the phone call. Computer systems have automated the clearance and settlement processes. And, of course, the trading process has been transformed, as well. Electronic Communication Networks (ECNs) and NASDAQ have automated the role of the exchange (at least for OTC stocks), and now algorithmic trading servers have begun to automate tactical and strategic order routing decisions. Both the buy-side and sell-side are looking to automation to improve trading performance and increase productivity while lowering costs.

Technology infrastructure

So if progress in algorithmic trading has been incremental, why does it feel as if we are in the midst of a revolution? The answer lies in the third main driver of progress in this space: advancement in technology infrastructure. The servers that run the major ECNs and NASDAQ have the capacity to handle the high order and cancel activity typical of algorithmic trading in an extremely low-latency environment. Network capacity has expanded to handle the growing volumes of innovative market data products, such as complete order book information, that these venues now disseminate. Data storage costs have declined to the point where market data, which can run to tens – even hundreds – of gigabytes daily, may be stored and analyzed inexpensively. Vendor and brokerage systems can now consume and respond to real-time data in intelligent and sophisticated ways. Like the other key drivers identified, the growth of technological infrastructure is not new. But only in the past few years has the technology advanced enough to support innovative algorithmic trading products with the scalability, redundancy, and reliability that buy-side customers demand.

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A self-fulfilling prophecy

Today, algorithmic trading has become something of a self-fulfilling prophecy. The more Wall Street adopts algorithmic trading tools, the more it depends on them to cope with their consequences. Algorithms, for example, have contributed to the large and growing volume of market data traversing industry networks. While overall market volumes have remained steady for the past few years, the average equity trade size has continued to fall, and the number of trades has skyrocketed. As of December 2004, average OTC trade size (475 shares/trade), average Listed trade size (393 shares/trade), and the level of program trading on the New York Stock Exchange (60%) all reached record levels. High volumes of quoting and trading activity have led to the twin problems of "quote flickering" and "tape shredding." In this environment, algorithms are increasingly critical tools available to traders. Algorithms can monitor market data, filter out "noise", and execute small and easy trades, allowing the trader to add more value to the trading process by focusing on larger and more difficult trades, gathering market color, and communicating with the portfolio manager.

Algorithmic trading also offers a host of tools to post or provide liquidity, thereby saving spread costs. These tools, however, have also accelerated spread compression, and in so doing, have driven dealers, the traditional liquidity providers, from the market. Capital commitment and block trading has become increasingly scarce, and, as a result, the

buy-side is being forced to take more direct control over their trading.

Finally, fragmentation of the US equities market remains pervasive, and consolidation of liquidity pools, elusive. Fragmentation represents a constant challenge to trading efficiency, introducing search costs, and increasing market impact and opportunity costs, all of which directly impact investment performance. Despite consolidation among trading venues – Archipelago/RediBook (2001), Instinet/Island (2002), and NASDAQ/Brut (2004) – and recent consolidation announcements from the New York Stock Exchange (NYSE)/Archipelago Exchange and NASDAQ/Instinet, these problems remain as frustrating as ever. In fact, while algorithmic strategies were originally created, in part, to address fragmentation, they now have the opposite effect by relieving the pressure to consolidate. By synthetically aggregating market data and access, and by offering advanced order types, such as reserve, sweeping, and scattering, algorithms simultaneously alleviate and contribute to fragmentation. So as venues merge, liquidity seems to leak out, either to smaller ECNs or to entirely new venues, such as Liquidnet and Pipeline.

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What the future holds

Given the current buzz regarding algorithmic trading, it is tempting to assume that algorithmic trading has been widely adopted, but you may be surprised at how low the rate stands as a percentage of overall volume. According to the Tabb Group, an independent consultancy, only 5% of buy-side volume is currently directed toward algorithmic strategies ("Institutional Equity Trading in America: A Buy-Side Perspective"). This figure is likely to grow in the future as systems and technologies continue to improve in their sophistication and ease of use. But as the basic technology becomes commoditized, the quantitative aspects of algorithmic trading will likely grow in importance as well. Brokers and vendors will add value by developing proprietary techniques for identifying, predicting, and responding to patterns in volume, price, and volatility. The sophistication of these algorithms and the ability to clearly demonstrate superior performance will likely be key differentiators in the future.

In the nearer term, however, regulatory issues will dominate. Regulation NMS as passed by the Securities and Exchange Commission on April 6 outlines significant changes to equity market structure. While its impact will be far reaching, two results seem certain with respect to algorithmic trading. First, trading server logic will need to be modified to incorporate new trade-through rules. Second, traditional exchanges will likely expand their automated trading functionality in order to compete with their electronic counterparts.

To date, Listed exchanges have been slow to adopt new trading technologies, with most innovation and automation confined to the OTC space. However, we have already seen a spate of new electronic trading products from the regional exchanges. In June 2004, the Boston Stock Exchange launched a new order type, Instant Liquidity Access (ILA), which offers truly automated, non-intermediated Immediate-or-Cancel functionality. The Chicago Stock Exchange and the American Stock Exchange are also working to unveil similar functionality.

Perhaps most noteworthy, the NYSE has outlined its new Hybrid Market, which would offer electronic and auction trading in parallel, by overhauling its Direct+ offering. However, this proposal has yet to be finalized, and if and when it is approved by the Securities and Exchange Commission, the NYSE has indicated it will still require at least 9-12 months to implement the necessary technology. These new developments and proposals signal a sea change at the NYSE and regional exchanges, and may permanently alter the market structure for Exchange-listed trading. **FIX**

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