



FIX: How standardisation affects competition and innovation

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Market participants contemplating FIX adoption are frequently concerned with the potential threat to market innovation and competition posed by standardisation. Originally designed to support trading between buy-side and sell-side firms, FIX has been expanded to support several pre-trade, trade, and post-trade business processes. The success of FIX is similar to other stories of standardisation: the evolution of the personal computer industry, local area networking and the Internet revolution. What is the potential impact of FIX (or any other widely adopted standard) on market dynamics?

Personal computers

Microcomputers existed prior to the release of the IBM PC. So what was it about the initial IBM PC that made it become a de facto standard that served as the basis for the WINTEL (Microsoft Windows running on an Intel or Intel compatible microprocessor) standard still in use today?

There was nothing spectacular about the IBM PC. It was priced higher than other products from Apple and the various manufactures of Z-80-based CP/M computers. Although sporting a '16 bit' microprocessor, the first versions were slower in processing than the 8-bit Z-80

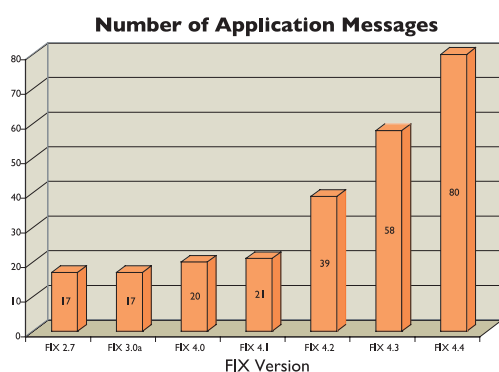
computers. The operating system provided with the IBM PC was a hastily assembled and feature-lacking operating system known as DOS developed by Microsoft.

One clear reason for the success of the IBM PC was that IBM developed it. IBM was the largest computer company in the world at that time. IBM's introduction overnight legitimised a market trend.

The other reason usually discussed was the fact that IBM chose to fully publish the specifications to the hardware and the firmware of the PC. The blue-coloured binder that

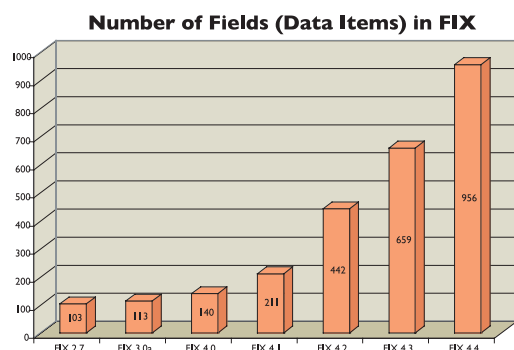
contained the IBM Technical Specification became the blue print for a multitude of small start-up companies and traditional competitors of IBM. IBM created the first open source product – the IBM PC. Further fuelling this openness was the wily negotiating done by Bill Gates and Microsoft. Microsoft convinced IBM to permit them to sell a version of the PC-DOS operating system to other manufacturers, thus creating an overnight de facto standard operating system.

Figure 1
Number of Application Messages Supported By FIX



The last reason was market timing. IBM saw the threat caused by the microprocessor and enabling applications, such as word processing and spreadsheets and reacted by embracing the marketplace instead of trying to fight it.

Figure 2
Number of Fields (data items) Supported by FIX



Local Area Networking

In the late 1980s the requirement for computer networking increased dramatically, based on the need to interconnect personal computers that flooded businesses after the introduction of the IBM PC in 1981. Two network

technologies vied for dominance in the marketplace. The first was a simple rudimentary system known as Ethernet, which was developed by a consortium of vendors including Digital Equipment Corporation (now part of Hewlett-Packard/Compaq), Intel and Xerox. The second was a much more elegantly designed solution known as ‘Token Ring,’ developed by IBM. The Institute of Electrical and Electronics Engineers eventually developed both technologies into standards. Ethernet became the dominant industry standard, over what could be argued was a superior technology from IBM. How did that happen?

Table 1

FIX Message Categories

- Pre-Trade
- Indications
- Event Communication
- Quotation
- Market Data
- Security Definition, Security Status, Trading Session Status (sometimes referred to as reference or standing data)
- Trade
- Orders
- Crossing Orders
- Lists (Basket Trading)
- Multileg Orders
- Post Trade
- Allocation and Ready to Book
- Collateral Management
- Confirmations
- Trade Reporting
- Settlement Instructions
- Position Maintenance and Reporting
- Registration Instructions

The primary reason for the success of Ethernet was simplicity and efficiency. The software and electronics required to support Ethernet were much simpler than those required to support the more sophisticated Token Ring. Ethernet was also supported by a very large number of vendors, lowering prices as competition increased.

Network protocols

The United States Department of Defense Advanced Projects Agency (DARPA) wanted to improve the return on investment in research and development by developing

technology that could permit disparate researchers to communicate and share their work. In the late 1970s/early 1980s, the ARPAnet was established to permit government researchers, private research organisations, and universities to share information on government projects. The Department of Defense (DOD) defined some very simple protocols to permit the disparate computer platforms and communications networks to interoperate. The government could encourage adoption of the protocol by requiring that these inter-networking protocols to be provided by various hardware and software providers doing business with the DOD. This little push created an overnight standard – TCP/IP.

Table 2

FPL Organisational Partnerships and Cooperation

Organisation	Year	Purpose
Bond Marketing Association (BMA)	1999	Support standard trading of fixed income products
SWIFT	2000	Support development of the ISO 15022 XML standard
Futures Industry Association (FIA)	2003	Encourage adoption of FIX within the listed derivatives market by providing expertise and direction to FPL from the FIA Standards Working Group
International Swap & Derivatives Dealers Association (ISDA)	2003	Provide interoperability and support for the Financial Products Markup Languages (FpML) used for OTC derivatives

The FIX Protocol organisation has worked with existing organisations by entering into statements of understanding on cooperation in the promotion of standard industry interfaces

TCP/IP benefited from a freely available 'open source' version of the Unix Operating System written at the University of California Berkeley Systems Division. Because it was free, it was widely used by universities in the US. These universities were also recipients of financial grants from the Department of Defense, which required TCP/IP. It was not long before TCP/IP became part of the BSD version of Unix – instantly providing source code for anyone else to use, if not directly, indirectly.

Shortly following the release of TCP/IP, the International Standards Organisation developed and released a set of Internet working protocols based upon an elaborate and elegant layered networking model known as the ISO Open Systems Interconnection model (ISO-OSI). The OSI networking protocols were in many ways much more elegant than the crude simplistic TCP/IP protocols. It was viewed as just a matter of time before the OSI protocols would dominate the marketplace. This never came about.

Why?

The first and most important reason had to do with availability – TCP/IP had a head start. If you were a computer vendor, you were required to support TCP/IP to do business with the DOD. Secondly, limited resources, such as limited bandwidth over networks, computer memory, and processing speeds favoured the simpler and more efficient TCP/IP.

As with Ethernet, the TCP/IP standard was more accessible and open to innovation than the standard controlled by the ISO, known for being removed from consumers and dominated by a layer of bureaucracy and politics.

Another important factor was the network effect of having a large number of universities and research organisations interconnected via TCP/IP. The network effect has been defined as the additional benefit provided to a marketplace (service) when the number of users able to access that service increases.

The last factor is that unlike the standards organisation controlled standard, TCP/IP was controlled primarily by two levels of consumers, instead of standards organisations or vendors. The primary consumer being the DOD, followed by the resulting second tier of consumers being universities and research organisations.

The same can be seen for subsequent standards, such as the dominance of Simple Message Transport Protocol (SMTP) over X.400 Messaging standards, SNMP (Simple Network Management Protocol) over CMIP (Common Management Interface Protocol).

The final nail in the ISO-OSI protocol coffin came when a simple, crude protocol, HTTP (HyperText Transport Protocol)

was released and made publicly available. HTTP along with the open source, freely available Web browser, MOSAIC fuelled the Internet revolution. The ISO-OSI versus TCP/IP debate was swept away in a fervour to gain connection to TCP/IP in order to gain access to the World Wide Web.

So what does all this have to do with FIX? FIX has benefited from the same market dynamics that made TCP/IP, the PC and Ethernet successful.

Market timing

The rapid expansion of equities trading and mutual funds in the 1990s made it necessary to enhance automation. The increased volume also created additional trading partners. The lack of existing automation and the ability of trading partners to persuade new trading partners to connect via FIX led to widespread adoption. FIX came into being at the right time.

Consumer-driven as opposed to provider-driven

The consumers, being large investment banks and fund managers, created and still maintain control over the FIX Protocol. Each time a marketplace or market participant becomes FIX-enabled there is an overall increase in Network Effect. FIX has reached a critical mass in equities, and this critical mass appears to be occurring in listed derivatives and is likely to occur in fixed income. Consumers continue to strongly encourage marketplace adoption.

The FIX Committee was structured carefully to maintain a careful balance between buy-side and sell-side firms, with a co-chair from each side leading the organisation. At that time, exchanges, vendors and consulting firms were excluded from participation in order to ensure that the firms maintained control. An interesting phenomenon occurred as FIX adoption increased. The issues over buy-side, sell-side, or vendor dominance never materialised. The benefit to all firms – competitors or not – was so compelling in using FIX that the feared control issues never materialised. All participants realised the benefits of co-operation to achieve a common standard.

FIX innovation occurs by market participants bringing real world business requirements to be addressed using the FIX Protocol. With few exceptions, technology is subservient to business requirements within the FIX organisation. FIX is a pragmatic, practical real world

response to a business problem, driven from the bottom up, as opposed to top-down technology-driven solutions.

Simple implementation and open specifications

The FIX Protocol is simple to the point of being crude. FIX is open. The FIX standards are freely available to any interested party. Advice and support for the protocol is also free. You do not need to be a member of the FIX Protocol Organisation to use FIX or benefit from the community of users that support the protocol.

How do standards impact competition?

How would the adoption of FIX impact futures and options markets?

It makes sense that providing FIX connectivity to market participants would increase the number of available trading partners based upon the number of FIX users now. While on the surface this sounds obvious, the fact that customisation is usually required because of the variations in FIX implementations, access to the multitude of FIX-enabled market participants is not automatic. FIX is not immediately accessible like Internet connectivity, telephone dial tone, or the electrical grid interfaces. However, there is a very apparent desire on the part of market participants to reduce the cost of market access. As enough markets exist that require FIX connectivity now, FIX is seen as a very obtainable way of reducing the number of disparate interfaces required for market access. The size of the FIX marketplace has created a large number of FIX-enabled trading applications, order management systems and FIX connectivity products.

Consumer demand for FIX interfaces leads to a minimisation of the 'lock-in' effect wherein the investment in writing to a proprietary interface keeps a market participant locked into a marketplace – making it much more costly to move to other marketplaces.

How do standards impact innovation?

To answer this question we need to realise that there are different types of standards. Each type of standard impacts innovation differently. FIX is an interface or 'compatibility standard.' As a compatibility standard, FIX specifies how entities communicate, not how they subsequently process the results of the communication. The exact implementation of the systems connected via FIX is not defined. How an order is traded once received, the marketplace rules, level

of automation, or the type of matching algorithm are not within the scope of the FIX interface specification.

What is within the scope of FIX is the behaviour or response to specific requests. The most controversial of these is the FIX order handling semantics. FIX requires an order modification and a chaining mechanism to tie orders to modification and cancel requests to the original order. FIX does not indicate, however, how a market should handle a change to an order – in terms of book priority or whether or not a new order is created as the result of an order modification. Adopters of FIX can continue to introduce innovations to their internal systems behind the FIX interface.

If you examine other industries, such as the cellular telephone, consumer electronics (including personal computers) and microelectronics industries, standard interfaces abound and are crucial for product creation and adoption. While standardisation is provided at several different interface points in these products, market suppliers are free to provide innovations and enhancements in terms of feature set, look and feel, and price. In fact, it is that innovation behind the interface that drives much of the consumer market.

As stated earlier, the FIX Protocol itself provides techniques for extending the interface to provide innovations in the interface, as well. This is, of course, done at the cost of transparent market access. However, this is a practical necessity for market innovation and a small price to pay. The FIX organisational structure is also highly accepting of innovations. A successful proprietary extension for a marketplace during one release is likely to be adopted as part of the standard in the next release.

Conclusion

Far from stymieing competition, FIX can be an enabler of competition by lowering the barriers to marketplace entry. Marketplace improvement can result from the availability of additional market participants enabled by these lower barriers. Because FIX defines an interface and not the order management system, trading system, or marketplace behaviour, market participants are free to innovate behind the interface. Vendors can still create a better trading system, order management system, or marketplace and still maintain FIX compatibility. When these innovations require modification to the interface, FIX

provides mechanisms and an organisational culture to readily adopt these changes.

The biggest challenge facing FIX going forward will be the maintenance of the grass roots, consumer-driven culture that has permitted the protocol to grow to meet the needs of a wider and wider variety of markets and participants.

The key challenge for FIX within the listed derivatives market is the inability for FIX to replace existing proprietary market making interfaces, such as EUREX API, OM API, LIFFEConnect, and CBOEdirect. FIX message size is small and efficient enough for listed derivatives order routing. The overhead of the tag=value format has proven to be too much for market data dissemination and, to a certain extent, challenges derivatives mass quoting applications. Innovations are underway to address this limitation. We are likely to see new optimisations to specifically address the needs of this challenging market space in the near future. **FIX**

An earlier version of this article first appeared in the Futures Industry Association "Outlook '04" Publication.

Jim Leman, formerly of Citigroup, often referred to as the father of FIX, contributed to this article.

A brief history...

In 1993, Fidelity Management and Research and Salomon decided to solve a problem for buy side and sell side equity firms by creating a standard protocol for electronic trading of equities. The goal was to create a simple, flexible protocol that could automate manual trading and also eliminate the necessity to create custom connections between various trading partners. The intent was to increase liquidity by lowering the technical barriers for market participants. The first proof of concept was implemented in December 1993. The original pioneers of this effort were Jim Leman (business) and Chris Morstatt (technical) from Salomon (now part of Citigroup) and Jacques Perold (business) and Bob Lamoureux (technical) from Fidelity Management and Research. At about this time, TCP/IP network protocols and UNIX-based systems were finding their way into mainstream financial services applications. The group chose TCP/IP as the networking software because it seemed to be the direction technology vendors were headed. The Internet explosion that followed reinforced the choice of TCP/IP as the basis for their proof of concept.

The FIX Committee was formed in June 1994 based upon the success of the Fidelity/Salomon proof of concept. The first FIX General Conference was hosted by Salomon Smith Barney in January 1995 and marked the release of FIX Version 2.7. FIX 2.7 is seen as the inaugural version of FIX.

Few argue the success and impact of the FIX Protocol on the financial markets. FIX is now well-established within the equities market. FIX is implemented globally, with versions that support double byte character sets for Asian and Japanese marketplaces. Futures and options markets have implemented FIX and usage continues to expand. Several ECNs and exchanges now support FIX.

FIX has also been adopted internally to support market interconnection. In 1999, led by Archipelago, several ECNs developed an inter-ECN network to disseminate book depth. The effect of this networking of markets was to identify disparate pools of liquidity – expanding aggregate market depth available to participants. Also, in 1999, the CBOE, at the strong urging of major brokerage firms, invested heavily in defining and supporting derivatives market making functionality into FIX. Starting in 2002, the Options Linkage Authority, which is operated by The Options Clearing Corporation, was formed to interconnect the five U.S.-based options exchanges. OLA provides an inter-market routing mechanism to support a national best bid and offer. OLA is based upon the FIX 4.2 protocol. The Chicago Mercantile Exchange continues to be a pioneer in

FIX adoption by leading the effort to standardise listed derivatives post-trade processing using FIXML (the version of FIX implemented using XML).

FIX Proliferation

The success of FIX within the equity sector created interest across disparate geographical regions and different asset classes. The FIX Committee responded to this interest by supporting regional conferences (see Table 1). Jim Leman (Citigroup), Scott Atwell (American Century), John Goeller (Lehman), Sam Johnson (formerly with Goldman Sachs, now CEO of TransactTools), Ryan Pierce (Archipelago), Kevin Houston (Citigroup) are to be credited with their early efforts to evangelise the FIX Protocol globally.

Table 1
Global Adoption of FIX

Region	Introduction
Europe	June 1996
Tokyo	October 1998
Hong Kong	March 2000

Other asset classes were included in the FIX Protocol as constituent groups were identified (see Table 2).

Table 2
Asset Classes Supported by FIX

Version	Year of Release	AssetClassesSupported
FIX 2.7	1994	Equities
FIX 3.0a	1995	Equities
FIX 4.0	1996	Equities
FIX 4.1	1998	Equities Listed Derivatives
FIX 4.2	2000	Equities Listed Derivatives Forex
FIX 4.3	2001	Equities Listed Derivatives Forex Fixed Income Collective Investment Vehicles (CIV)
FIX4.4	2003	Equities Listed Derivatives Forex Fixed Income OTC Derivatives (via support for FpML product definitions)