Electronic Marketplaces

Stuart Feldman • *IBM* • *sif@us.ibm.com*

Electronic marketplaces are becoming important players in several industries because they promise to greatly improve economic efficiency, reduce margins between price and cost, and speed up complicated business deals. The services they provide will expand many companies' purchasing and selling abilities, and will make prices more dynamic and responsive to economic conditions.

E-marketplaces are fascinating because they present serious technical challenges. Several vendors (including IBM) offer software and services to support them, but requirements are expanding and shifting as markets develop. E-marketplaces are sensitive to business details, and small changes in the rules of engagement can profoundly alter a marketplace's attractiveness and profitability. Only a few exchanges and e-marketplaces, such as www.freemarkets.com and www.metals.com, have been launched so far, but there are plans to deploy more than a thousand within the next year. Most will be exchanges, a fundamental form of market.

Why Exchanges?

Exchanges make it easier for multiple participants to buy and sell similar goods. The majority of these sites will be *vertical* exchanges, which focus on specific types of goods or the needs of particular industries. Several are already functioning in such key areas as metals, plastics, electronic components, and wood products (for example, www.e-wood.com, www.metalsite.net). As shown by Covisint, owned by a group of the biggest auto manufacturers, a focused exchange need not be small; it anticipates handling US $240 billion per year (which is greater than the GDP of Sweden).

The most obvious physical-world model is a stock exchange, which deals in well-defined interchangeable commodities: publicly traded securities. These markets trade huge volumes and impose rules designed to increase *liquidity*—the ability to trade considerable quantities without upsetting the market or prices. They are also highly efficient (the *spreads* between asking and selling prices are small). In contrast, corporate and municipal bonds are not traded on central exchanges. Millions of different bonds have been issued, and it can be difficult to locate specific ones. Electronic bond exchanges are now being launched, however, and they promise faster execution and smaller spreads than their offline counterparts.

A successful exchange can aggregate more activity than an individual buyer's or seller's site, but a marketplace's structure determines whether it is a desirable place to do business. E-marketplaces manage participants, information, and business processes—the flow of information and the business transactions that are the heart of the activity. More formally, an exchange should support security, liquidity, transparency, efficiency, and anonymity.

e-Marketplace Requirements

The marketplace controls who can do what, and although the rules may be public, many transaction details are kept private. Individuals and organizations play a variety of roles—acting as buyers, sellers, auditors, information vendors, finance providers, and other intermediaries. The marketplace identifies and qualifies these participants and maintains data such as reputation, credit-worthiness, and experience. It thus enables potential buyers and sellers to locate one another. It also provides information on products, prices, availability, and current and past activities, as well as keeping records required by regulators and auditors.

This sounds straightforward, so why the excitement? One reason is that technological solutions that satisfy all parties' needs can prove very challenging. Moreover, a lot of money will be made and business relationships will shift radically in the emerging e-market economy, in ways that are important but unpredictable.

A marketplace must be capable of handling rapidly changing loads and maintaining information security throughout the process. Depending on the business situation, participants may want the marketplace to hide their identities, current trading positions, histories, or ongoing activity with other players. Database and communication security are fundamental but not sufficient for these tasks. On the other hand, marketplaces must also be able to guarantee reliable and timely information for participants to trust them. (Regulators and auditors may have even more rigorous requirements.)

Business Advantages

A successful exchange shows *positive network effects*; that is, the more traffic it has, the more desirable it is to new participants. First-movers can gain the

advantage because the first satisfactory exchange to cover a particular category may prove to be the sole survivor. It will have considerable market power, which means large potential profits from the data it possesses and the ancillary services it provides. Participants in exchanges will insist on communicating, and transacting business, with other exchanges, however, and these interoperability requirements may reduce first-mover advantages. They will certainly make it more difficult to build the infrastructure software.

Markets are essentially services, and as they evolve they will have to support advanced techniques that are unusual today, such as *yield management*, which airlines use to maximize profit by changing seat availability and price on each route. E-markets will be open to a wide variety of participants who will seek to establish strategic advantages from dynamic pricing and delivery decisions. The software challenges for supporting such marketplaces are severe. Systems will need to run reliably and continuously while managing large amounts of valuable data and executing complex processes. They will have to support many simultaneous multiparty real-time communications, including connections with other marketplaces and a variety of third parties, such as financial institutions and regulatory agencies.

Subtle Decisions

An exchange's attractiveness and value will be determined by many subtle decisions, and the implications may not always be obvious. Fine points have historically made some major impacts.

Frequency of price change. Prices can change infrequently or continuously, depending on custom or need. Stability simplifies transactions and makes life simpler, but one attraction of e-markets is their potential speed. At one time, the worldwide price of gold was determined by a handful of London bankers at their daily fixing. Some Third World stock exchanges opened only once or twice a week to trade a few shares. On the other hand, the New York Stock Exchange now trades continuously during each day, and many deals are made every second. Such high-end systems are the model for new online exchanges, and they will all face the design and operational challenges of continuous availability, rock-solid data reliability, accurate transaction handling, and rapid and fair distribution of market-state information.

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Unit of price change. It may seem a trivial issue, but the unit size of price changes can radically affect trading profits. American stocks traditionally traded in units of 1/8 of a dollar (12.5 cents), for example, but research studies in the mid-1990s showed that prices on NASDAQ were often measured in multiples of 1/4, effectively doubling the spread. Further studies alleged that this increased the market makers' overall profits by billions of dollars. Stock prices are often quoted in units of 1/32 these days, and the SEC has mandated that they soon be quoted in units of a cent.

Currency. The currencies in which prices are quoted can have both technical and business implications. For one thing, conversions can introduce round-off and even reveal the country of origin of anonymous bidders. Most exchanges operate in a single currency and leave it to participants to perform the conversion. In the future, e-marketplaces may take more responsibility for problems such as currency risk (if the relative currency values shift between the time of bid and payment) and mixed-currency bids. Multipartner barter deals can be constructed to circumvent the rules that prevent converting or moving certain currencies.

Information Management

Marketplaces can manage and present information about goods and trading status in different ways. Commodity markets typically offer a limited array of products, each described by a few parameters such as a stock name or a product grade. Other goods demand more extensive descriptions. On eBay, for example, there are usually more than four million different items for sale at any one time, and each is described by a few lines of text and perhaps a picture. A piece of fine art at a specialty auction, on the other hand, might be accompanied by a scholarly article or a monograph. Potential buyers may still want to personally examine goods or consult independent experts before committing to a sale. All of these options require different technical solutions and may call for varying degrees of security, authentication, and access.

Sometimes, information is shared with a limited number of potential buyers or sellers in order to maintain confidentiality or reduce information distribution costs. In procurements for complex software or building projects, some requests for proposal (RFP) can run to hundreds or thousands of pages and reveal much about the buyer's business plans. Thus, RFPs are often managed under rigid sets of complex rules that govern information release, data sharing, eligibility, and criteria for choosing the winner. Potential bidders may be chosen after a qualifying round during which they reply to a request for information, and it is common practice that all active bidders receive timely copies of answers to questions submitted by any one of them. Sophisticated procurement hubs and e-marketplaces need to manage such processes and ensure their integrity—often for large numbers of participating entities.

E-marketplaces can provide a unified view of goods offered by various means, and they will enable numerous ways to make deals. Offering goods at fixed dates and prices is a simple but static approach that basically extends the traditional catalog. On the other

hand, most exchanges support auctions, which are a more competitive way to sell. There are hundreds of auction types, and details matter greatly in their success. Some ambitious public auctions have become fiascos, for example, because of mistakes in setting rules about revoking bids or demonstrating ability to pay.

Conclusion

We are now witnessing the earliest, experimental stage of e-marketplace development. Most firms are focusing on exchanges with fixed auction rules applied to relatively simple goods and services. Many exchanges will fail due to bad timing or inappropriate choices in business details or technical implementations. But the winners will play a huge role in the worldwide economy as they focus decision-making and improve market efficiencies.

How will electronic marketplaces evolve? They will almost certainly expand to support ever more complicated scenarios. Even today, multiround auctions, RFPs, and negotiations are the norm for expensive procurements; technological advances will permit their use for larger numbers of smaller deals. Processes will be increasingly automated, using sophisticated analysis techniques and large-scale computation.

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As participants get closer to reaching a deal, they will reveal more information and make further decisions, and new facilities will enable intelligent agents to participate in discovery and transactions. E-marketplaces will also expand to support involvement by skilled specialists who need to share relevant data and to plan and negotiate flexibly. In time, e-marketplaces will include richer collaboration and information-management facilities, and will grow to combine the capabilities usually associated with portals and content sites with those of advanced exchanges. ■

Stuart Feldman is director of the IBM Institute for Advanced Commerce and manages a research staff of more than 80 researchers in network-related technologies, including e-commerce, Internet media, and antivirus systems. Feldman is an IEEE Fellow, an ACM Fellow, a member of Phi Beta Kappa and Sigma Xi, and is chair of ACM SIGecom. He is on the editorial board of *IEEE Internet Computing*.

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