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## **Taming the Wild Euro: A Technology Review of the future**

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### **Abstract**

The next ten years will bring major change to the world of banking, securities trading and finance. Influenced by the key converging factors of the Internet, the euro, the Y2K Problem, same-day-settlement, and electronic trading networks, the future will find us in a world with one-third fewer banks and one-third fewer stock exchanges. The vast majority of trades in listed securities will occur on private networks. Y2K will force the failure and consolidation of as many as 20% of small to medium size financial services companies, including small brokers, money managers, hedge funds and investment advisors. Foreign exchange revenues will dry up for banks trading in Euroland, and an onslaught of competitors will arrive there from our side of the Atlantic.

Over the course of the next ten years, many mid-size financial services companies will realize that they cannot afford to keep up with their investments in technology, and will merge with better capitalized, technologically savvy companies. The transition from T+5 (trade date minus five days) to T+3 (trade date minus three days) was straightforward for most companies. The transition from T+3 to T+1 and T+0 (trade date plus one day settlement, and so on), however, will be much more difficult. Companies that have fudged by until now with manual processes, and late night clearing schedules on high-volume days will simply not be able to compete in the new, continuous settlement marketplace.

By the end of the next decade, the rules for survival will be quite simple. The winning corporate and financial services firms will need: vast liquidity, a global physical presence, a global Internet presence, command of major marketshare or important market niche(s), and excellent management and execution of technology.

By 2010, the lion's share of business will go to those who best create and execute technology strategies in support of business objectives.

## Introduction

Starting January 4<sup>th</sup> 1999, marks, francs, lira and pesetas along with 7 other national currencies have all become denominations of the euro as pennies, nickels and dimes are denominations of the dollar. Their currencies are irrevocably pegged to the euro. If one wishes to convert francs to deutschemarks, conversion must be done through the euro. This is called triangulation: from francs to euros to dm. Foreign exchange (fx) trading will soon cease to exist in these currencies. For these currencies, fx trading is now done exclusively in euros. Where existing national currencies are quoted, the prices are all derived from the euro. All euroland equities will be re-priced in euros. All participating country's exchanges have denominated their securities in euros. Most corporate securities will be re-denominated at the country's and or the issuer's discretion. Not all sovereign debt has been re-nominated, however, all new debt is being priced in euros. Every single financial application and system will have to be reviewed, analyzed and updated or re-programmed." unlike y2k, where every application needs to be reviewed, the euro only affects financial applications and functions. ERP packages such as Sap and Baan and Peoplesoft all required patches and upgrades. All multicurrency trading systems needed upgrades. All single currency systems will soon be obsolete!

The next few years will see a major impact of the euro on technology and financial services. The goal of this paper is to better inform technologists serving the business and financial services community of possibilities and changes related to the European Monetary Union (EMU), and the introduction of the euro currency.

Although unprecedented in its own right, the euro phenomenon does not exist alone, but must be seen within the framework of immense changes that are affecting the business and financial services community. We therefore have decided to discuss the euro and its impact against the backdrop of revolutionary developments in the marketplace, which are not only socio-political in nature, but both business and technology driven as well.

This article analyzes, reviews and discusses the major trends in the marketplace and market data services. In short, these trends are Convergence, Consolidation, Globalization, the euro, Y2K, Decimalization, T+0 (trade date plus 0 days, or continuous settlement of trades) , and the Internet. Taken together, they represent the largest shift ever in financial services.

This article is directed at business line managers and technologists to help them become better informed about the marketplace and their options in it.

## Market Data Services (MDS) Defined

For the purposes of this article, the aspects of Market Data effected by the euro are broadly defined as encompassing the following sets of information:

- Realtime and delayed exchange based data, e.g., stock and listed bond quotes.
- Realtime and delayed off exchange data including Treasuries, FX, and dealer contributed data.
- Derivatives data including structured instruments, Swaps, Repos, credit derivatives, etc.

- Fundamental data including company performance, earnings, profitability, key ratios, terms and conditions of bond issues.
- News including real time or delayed general business news and specialized market commentary.
- Research data including analyst's reports, market research, and deep news search.
- Billboards, postings and chat rooms – the new frontier in market data and rumor dissemination.

Each of these types or sets of data are used throughout the financial services world. Although traders and off the trading floor workers have different market data needs, they are both major consumers. And, as a result of the Internet and the growing number of individual investors, retail consumers now demand market data, which has serious implications for the industry as a whole.

### **The Impact of Euro**

Pray for the poor financial technologist. Just when you thought you had a grip on your Y2K integration testing, and had implemented an Intranet to distribute quotes, news and research across the company, along comes the EMU and the introduction of the euro to throw a wrench into the works!

Starting January 4<sup>th</sup> 1999, marks, francs, lira and pesetas along with 7 other national currencies have all become denominations of the euro. By January 2002 new euro coins and notes will be issued; by 1 July 2002 at the latest, all the national notes and coins of the participating member states of the euro zone will cease to exist. Every single financial application and system will have to be reviewed, analyzed and updated or re-programmed.

The countries participating include Belgium, Austria, France, Finland, Italy, Ireland, Luxembourg, the Netherlands, Germany, Spain and Portugal. All financial services companies that trade with firms in these countries, or have branches in these countries will be affected. The impact of EMU will affect not just Western Europe, but the U.S., Asia, Latin America, and Eastern Europe as well.

The introduction of the euro represents a fundamental re-alignment of the European economy, not to mention financial services technology. Banks and brokerages, already stressed with Y2K compliance issues, are scrambling to deal with the added pressures of euro compliance. Market data vendors are upgrading their information feeds, and providing test data sets so that their clients can make the necessary changes to a whole range of trading, risk, valuation and portfolio management systems. These changes are intended to insure that the management systems will work when marks, francs and lira go away.

### **Comprehensive Testing**

A comprehensive testing plan is crucial to any successful EMU readiness initiative. A detailed testing plan will provide an evaluation of systems ability to support transactions in the euro environment.

Successful testing starts with establishing the testing scope. The changes made to systems must be considered as well as any new business processes required for the euro. A baseline of the business functions should also be established at this time for testing purposes. A euro testing plan should encompass more than just a system's ability to accept euro transactions. The testing plan should also focus on issues like precision requirements for rounding and decimals. The testing scenarios can range from evaluating whether a system can successfully perform triangulation for currency conversion, to verifying that all currency driven tables have been remapped for the euro. The testing plan should not only include testing scenarios for regular daily operations but also special situations. Special situations for euro testing include conversion weekends and processes for booking an "as of trade, or correction of trade " for the pre-euro period. As of trades are valued at a pre-agreed on date, rather than the trade date itself.

EMU compliance sign off requirements should be established while the testing scope is being developed because EMU compliance can have different definitions. Acceptable system standards should be clarified before the test results are reviewed. Given the limited time to have systems evaluated for euro compliance, a schedule of testing milestones should also be formulated at this time.

After the test scope and standards are defined, the EMU test cases and their expected results can be formulated. This may pose a challenge, as a test data set will need to include euro and redenominated transactions. This data may have to be created. Legacy European currency and non-European currency denominated data should also be included in the test data if they will be processed by the system after the euro is introduced. Expected results should be clearly defined for testers because they will be detailing new euro transactions and processes, such as referring to new yield curves and processing fractional shares.

Types of testing should be established by reviewing the requirements of the systems and testing resources available. A system's new functionality must be tested to ensure it functions properly and follows the required business logic. This will require testing positive actions, such as entering euro trades, and negative actions, like entering invalid settlement dates. Functionality existing prior to the euro updates must also be tested to ensure the system has not been altered in an unintended way.

Testing a system's ability to process very high volumes, stress testing, may be useful in EMU testing. The volume of euro transactions and the demands for a system's euro functionality can only be estimated when the euro is actually introduced. A system could have higher than anticipated demands placed upon it, especially if the euro becomes a dominant currency as expected. This type of testing should also be applied to mission critical applications. For example, an application that has been designed to convert positions into the euro over conversion weekend should not have any risk of failure; especially given the potentially high volumes it may be processing.

A system's interfaces must be tested. A system's ability to process the euro on its own will be of no use if this information cannot be communicated to other systems front to back. Integrated system testing will be one of the most difficult phases of testing for an EMU testing coordinator to develop, as it will require cooperation between all areas impacted by the euro. Diverse areas

will have to coordinate and verify data quality for integration testing, from the main data entry point, such as trade capture, right through to areas like general ledger, credit and confirmation systems. Testing should also include batch processes. Batch processes should be examined across their entire scope, not just a daily run. This will allow procedures impacted by the euro, like interest accruals, to be tested.

Company wide integration testing has the potential to go smoothly when there has been a diligent EMU project office providing clear guidelines so that every department within a company has approached EMU processing in a similar manner. Alternatively, integration testing could bring to light the problems that occur when areas within the same company are allowed to take individual views on EMU requirements.

When integration testing expands to include outside dependencies it becomes more challenging. First, a system's external interfaces has must be established. Does the system utilize a market data provider for bond prices, a messaging system to confirm trades with clients, or interface with a custodian bank to instruct payments? These dependencies are all potential weak links that could bring down a system. Any EMU testing coordinator who hears the words "don't worry, we'll be euro ready" should remember their own efforts to get to euro readiness and consider whether they are prepared to believe someone else.

Even if an outside system is euro ready on time, changes may have occurred in its system or the company's system that may effect the flow of data and must be tested. However, not all external interfaces will be evaluated at the same level of testing. An EMU testing team will need to survey external interfaces to establish what testing support is available and if it will be sufficient. The range of testing support available from external interfaces can vary from engaging in actual simulated trading, providing test data, have a simulator available to compare conversion results, or not providing any testing support at all.

What can be done to accelerate the testing process if the EMU deadline is approaching faster than desired? Given the limited time available for remediation of code if there are errors, what constitutes a successful test must be carefully considered. There may not be time to fix every bug in a system, so issues must be prioritized. It may also become necessary to concentrate initially on the systems most critical to maintaining business processing if the EMU deadline is closing in and testing is not complete.

Testing tools may be reviewed to evaluate whether they would be of assistance for euro testing. A testing tool would have to be evaluated based on its ability to test for the euro and related processes like currency conversion via triangulation; its ability to interface with system; and the amount of effort that would be required to configure a testing tool for use with a system. Another solution may be to retain additional resources specifically for EMU testing projects.

Due to the limited time to put euro ready systems into production, efficient scheduling of testing resources must be implemented. Year 2000 initiatives may be competing for the same testing resources as the euro initiatives. If possible, systems within a corporation should be in functional testing concurrently, rather than sequentially. This will enable all systems to be ready as soon as possible for integration testing. Also if systems have passed their functional testing

prior to participation in integration testing, the scope of possible errors should be narrowed down to only those having to do with communication among systems.

A carefully developed and executed testing strategy will go a long way to helping an EMU coordinator have peace of mind. Even if the systems don't test cleanly initially, at least, the problem areas will have been identified. Then it will be apparent which issues require further attention and what contingency plans may be needed.

## **Contingency Planning**

While financial services firms and most large companies are busy developing strategies and products that capitalize on a 'single European currency,' some smaller firms are just beginning EMU impact assessments. Others are busy surveying vendors to discover what changes will come with the new year and the advent of the euro. According to some EMU experts, there is an alarming degree of systemic risk that endangers even the most prepared companies.

Unlike any other event in history, the European Economic and Monetary Union does not affect a single currency, security type or country of issue. In January, eleven distinct currencies and the ECU have melded into one seamless European cash equivalent. Equities, debt, simple and complex derivatives deals and a number of exotic contracts are undergoing revaluation, redenomination or renominalization. Many deals will be left in the legacy currency, forcing financial services firms to interpret values, manage risk and make investment decisions in multi-currency equivalents. And even after the Big Bang conversion on "Le Weekend," (weekend of January 1, 1999) the three year transition period of "No Compulsion; No Prohibition" presents a unique challenge to individuals, companies, investment managers and sovereign nations inside and outside of the EMU.

Most likely, not everyone is still ready for business after "Le Weekend". While many firms have focused resources and planning on Year 2000 readiness, the EMU has been relegated to secondary status. A number of firms have developed their EMU programs in development environments, commingling preparation for the euro with new product launches, system enhancements and software upgrades. Unlike the average cradle-to-grave system cycle, the Year 2000 has brought a wave of new system implementation and software change. Firms are using the opportunity to replace aging systems and to enhance functionality while meeting the need to be Y2K compliant. The euro has blended into the Y2K furor, receiving ancillary treatment, limited testing and passing mention.

What makes the EMU such an extraordinary event that it should warrant a share of the spotlight? Perhaps most astonishing is the tight timeframe and the variety of information that has been determined in the recent past. Still, many decisions regarding the exact nature of some instruments remains to be made, while other decisions are discretionary and dependent upon each participant firm, bank or institution. Added to the evolving standards is the challenge of a variety of approaches to conversion and the high degree of interconnectivity that makes the securities industry unique.

Unlike any other industry, investment management is highly interdependent. Exchanges rely on information from market makers, which rely on data from vendors, who compile disparate data from a collection of small and large contributors. Ultimately, the failure of any one component in the information web can cause the collapse of the greater whole. Depending on how many contingencies rely on the pieces of missing data and on how relevant that data is, the success or the demise of even the best prepared player in the post-euro world depends on external agents.

Contingency planning becomes paramount to ensuring success. Already, most firms have completed or will complete a survey of their vendors, information feeds and other suppliers. Although these may not be complete assessments, the amount of information on conversion strategy, on post-EMU procedures and on client requirements available through these assessments indicates the level of preparedness at other firms. From these indications, companies must design watch lists, indicating which providers are likely to fail during or after conversion weekend. An indicator of the criticality of information, data or supplies from these providers also has to be determined and evaluated.

A useful checklist for the process can include the following:

1. Study existing business processes, including reports, data, and both manual and automated procedures.
2. List pre-dependent reports, systems, actions and data.
3. Prioritize these using a measure of importance to future steps (Priority 1=indispensable, 2=important, 3=necessary, but not critical to future steps, 4=reconciliation or post-process audit, 5=not relevant).
4. Examine the business process given a 'EMU State of Operations;' How is the process different when the EMU comes into being and when the euro is the currency of operation?
5. Highlight the reports, data fields, information and previous steps that will be affected by changes in currency.
6. Ask providers of information (internal and external) about the preparations they have made. How will reports change? What fields will be added? What new considerations will be taken into account now that twelve currencies have rolled into one?
7. Carefully evaluate the business solutions offered. Are the changes reasonable to *your* business requirements? Does the format help you or will you need to make changes?
8. Gauge the likelihood of completion. Is the provider of information or services a leader in the field? Are they behind? Can their technology be adapted easily?
9. Highlight probable areas of concern. Monitor these carefully and insist on progress reports.
10. Design work-arounds, explore alternatives and prepare a contingency plan for each likely scenario.

It is important to note that the most prepared firms will fail if major dependencies do not provide the information needed on a timely basis and in a useable manner. The EMU will force data providers to add information fields that denote country of issue on securities, replacing the formerly sufficient currency indicator. Additional information will be formatted into reports and

fed into systems, perhaps without ample warning or notification from the source. As each firm in a line of data exchange makes adaptations that fit their technology and their business model, each subsequent recipient of data must alter the way in which it accepts and processes this data.

Perhaps most disconcerting in the case of the EMU is the lack of true “through” testing. While many firms are thoroughly testing their systems, software and reports for compatibility with the euro, there is a lack of complete integration testing. Dependence on external vendors, files and the variety of test dates and test cases being used by different companies forces creative solutions to integration testing. This compromise, where files are artificially created to feed subsequent steps, works to provide complete unit testing of business systems and processing. Unfortunately, when the time comes for implementation, a true file or readable data may not replace the manufactured file.

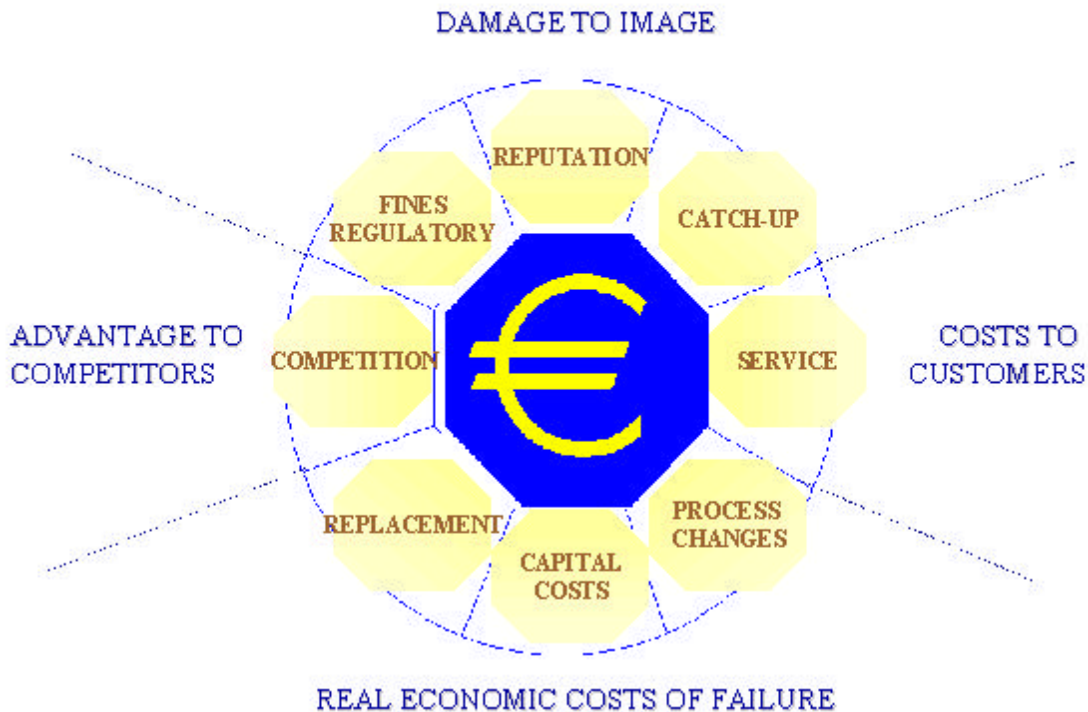
To give a real example from the securities industry, let us examine the daily process of wiring payment instructions for a securities settlement. Most EMU-conscious firms have instructed their agents to establish euro accounts for payment. Assuming that the agent bank has complied with instructions, that the account number has been established and reported to the requesting firm and that this information has been duly noted on all settlement instructions transmitted from the firm, a number of problems can still occur. The Society for Worldwide Interbank Financial Telecommunications (S.W.I.F.T.) will allow testing of message formats and will confirm proper formatting of information. However, incorrect account numbers, processing difficulties at the receiving agent, or related errors will only be discovered when all systems are tested from front-to-back – more often than not, on the first day of the EMU.

While coordinating complete tests with agents through S.W.I.F.T. is possible, some of the same coordination is more complicated. Internally, many firms rely on a combination of files and data sources to compile reports and extract information. Systems running particular steps in the process may not be able to run daily routines and related EMU test work. More importantly, the potential for mixing jobs from the EMU test environment with daily production work presents an added risk to firms struggling to be EMU compliant.

To many firms, the cost of not being prepared for the euro may be a day’s worth of processing, a back-up in batch work or a slow-down in productivity as problems arise from internal or external failures. Figure 1, illustrates some of the other risks of being unprepared - either as a firm or for the failure of dependencies. These include, damage to image, costs to customers, economic costs of failure and advantages accruing to competitors. For instance, a late delivery or failed payment calls into question a firm’s preparedness for other technological challenges; particularly the Year 2000. A day of failed business may cause late payments, overdrafts or funding issues which would alert regulators to future problems or incur fines. In addition, the added task of making repairs, finding work-around and providing service for two days, or three, adds pressure to resources and staff.

Business failure takes a toll on existing relationships. Whether due to a firm’s failure or due to a dependency’s failure, a client can only confirm that he/she did not receive the expected level of service from *the service* company. Alternative providers of comparable service, previously ignored by clients become reliable back-ups or even primary providers of service.

## Risks of Not Being Ready



**Figure 1: Risks of Not Being ready**

Finally, failure forces quick action and scrambling for solutions that incur capital costs, business process changes and replacement of systems and software post-failure. The speed and dire need to find alternatives to an existing and pervasive business failure can force unresearched ‘quick fixes’ that may not provide effective solutions or thoughtful investment of development capital. Contingency planning, while seemingly a cursory exercise or a formality in the business process, can be as important a component to success in the post-EMU world as careful planning, testing and implementation of EMU-compliant systems. Readiness is essential, but complete readiness covers all contingencies.

Although there are too many euro “change drivers” affecting businesses and their market data needs to be mentioned here, some of the key euro market data issues are included in the list below:

- Changes in symbols affect datafeeds and displays.
- Changes in vendor API’s affect in-house proprietary applications.
- Excel Macros, DDE Links, OLE Links, Tibco MarketSheet, and Triarch Kobra display applications will all need to be analyzed and updated.
- Historical datafeeds will need to be tested.
- Pricing and valuation models will need to be analyzed and updated.

- Updated character set will need to be downloaded to every Windows 95 and NT desktop to support display of euro symbol.
- Vendors need to be contacted to evaluate their euro compliance.
- Full integration testing is required for all in-house euro affected applications.

(Source – PricewaterhouseCoopers LLP Management Consulting Services, January 1998)

## **The Globalization of Financial Services Companies**

### *Convergence, Consolidation and Globalization*

The bywords for financial services over the next ten years are Convergence, Consolidation and Globalization. First let us define and discuss our terms. Convergence is the coming together of multiple business lines under the same roof. For instance, it is now quite common to find a commercial bank that also does retail banking, and further, has trading and investment banking activities under a Section 20 subsidiary. Sell side investment banks also have asset management divisions. And insurance companies run trading floors and funds, and underwrite debt. So, it is clear that the old definitions of the commercial bank, the retail bank, the money manager, the insurance company and the brokerage firm don't quite fit any more, since they are all doing each other's business.

### *Consolidation in Banking*

Consolidation is running rampant across the industry, and not just because firms are interested in expanding their lines of business, but simply because *there are too many banks and brokerages in the world*. In the United States alone, it is estimated that there are over 9000 banks, and 3000 brokerage firms, and 8000 asset managers and advisors. Over 3000 banks have failed or were merged out of existence since 1984 (source New York Times, Wall Street Journal) . Consolidation will further decimate the ranks of the financial services industry. It would not be surprising to see this number decrease by one third over the next decade. These massive changes in the financial services industry are being driven by technology, changes in consumer and institutional needs, and by changes in regulations.

This consolidation trend will only accelerate in the next millenium. Since the 1980's, when John Reed, Chairman of Citicorp announced that he was going to develop a financial supermarket, the trend has been building in the industry as demonstrated by the various mergers and shakeouts over the past 15 years. Finally in 1998, Sandy Weill (CEO, Citigroup) proved that it was possible to combine Commercial Banking, Insurance, Brokering, Money Management, Underwriting, and Retail banking lines of business all under one roof.

All this convergence has been done under the watchful eyes of the Federal Reserve Bank and the Securities Exchange Commission. And it has been accomplished without Congress having repealed the Glass-Steagel Act of the depression era 1930's. This act, which separated investment from commercial banking, led to the creation of the JP Morgan Guarantee Trust Company, the Morgan Stanley investment bank, and Bankers Trust Company . Now we have Morgan Stanley Dean Witter Discovery and Company, an investment banking-brokerage-credit services company. It seems that everything old is new again.

Says long time industry observer David Longobardi, publisher of Securities Industry News (personal interview 10/98):

Right now, there is no more compelling item on the agenda of the securities industry than the requirement truly to come to grips with the arrival of the global economy. By now, it is beyond argument that every market participant needs a sound risk management system. And it is similarly undeniable that every player in the investment community must simplify and speed up its interfaces with customers and counterparties around the world. Nor can we dispute the need for ever more timely methods of gathering and disseminating global market intelligence. So, "coming to grips with the global economy" may be a problem for economists and strategists, politicians and diplomats, chairmen and CEOs. But increasingly, it is a problem of networks.

As American firms have globalized their businesses, so too have banks, brokerage firms, insurance companies and money managers. More than 250 of Fortune 500 companies get half of their revenues from abroad. Banks have had to expand their presence and range of services offered across the world to meet the needs of their largest customers.

Concurrently, large euroland firms are implementing reviews of their banking and custodial arrangements, with an eye toward reducing the number of banking relationships they maintain. The reduction will be possible since the firms will no longer need to maintain local currency accounts in each of the participating countries. As foreign exchange revenues dry up, and the largest companies reduce their banking relationships to a handful, Europe's financial service companies will be hard-pressed to make up for the lost revenues elsewhere. The cozy, old world relationships that have grown up for years between Euroland industry and finance will crumble in the onslaught of competitive cost cutting. The coming European financial services consolidation will make the S&L crisis of the 1980's look like a cakewalk.

## **Consolidation of the Exchanges**

### *Exchange-based data*

"May you live in interesting times" is an ancient curse. Globalization and consolidation affects the entire fabric of the financial services industry. Market data vendors are not spared, nor are the Exchanges. The major Exchanges make 25% to 30% of their revenues from selling market data in the form of "Exchange Fees". The management and tracking of these fees is the bane of many a market data manager.

Market data vendors are in a quandary, however. Selling market data is profitable, to a point. With the consolidation in the world of finance, the trading floors get bigger, but there are fewer of them. The number of traders, as the main consumer of market data, is declining. So the trading floor as a venue for market data is a "mature" market, growing at 8%-9% per year. This kind of growth does not command great multiples in the marketplace. So where is the growth in market data, and where is the money to be made? There are two main areas of growth that come

immediately to mind. The first is market data off of the trading floor (“OTF”), and the second is in transaction services.

The OTF market can be split into two main groupings. The first is off of the trading floor in institutions: the middle office, the investment bank and the back office. Here delayed market data, quotes, and end of day data supplant the need for realtime quotes, and thus the incursion of exchange fees. Growth in this venue can be as high as 18%-22%. The second group are the retail consumers who use market data as part of their online trading and use the Internet for stock tips and research. As the major vendors scrambled to re-purpose their data for this new market, myriad small vendors rose up to meet the demand. In the Internet venue for revenue growth the sky is the limit. We will cover more on this in the Internet chapter below.

### *The Rise of the Electronic Crossing Network (ECN)*

The consolidation of Market data vendors, along with the mergers of the exchanges acts to facilitate the already high growth of electronic communications or crossing networks (ECNs).

The business of ECNs is not new to vendors, considering the tremendous success of Reuter’s Dealing 2000-1 and 2000-2 (conversational trading and anonymous matching for foreign exchange) and Instinet (an electronic exchange for trading of equities). Dealing 2000-1, since its beginning in the early 1980s as the Reuters Dealing Monitor System, (RDMS) overcame the logjam that traders encountered when trying to exercise trades via traditional telephone conversations. Dealing 2000-1 improved foreign exchange trading as it allowed dealers to converse online in a closed network with four counterparts for prices and trades. This evolved into an automated, electronic central exchange for currencies as Dealing 2000-2 (or Matching) which provided for contributed pricing and limits to be matched anonymously and then confirmed with printed tickets.

Reuters estimates that the advent of the euro will result in a nearly 10% decline in Foreign Exchange (FX) turnover for Euroland. This translates into a roughly 30% decrease in FX revenues for the impacted firms.

Instinet, the brainstorm of William Lupien (now CEO of OptiMark Technologies), was the first block trading system for equities and was introduced in 1969. It has grown into one of the most successful electronic brokerage service and belongs to 17 exchanges around the globe. Instinet does provide full brokerage services to the institutional traders, therefore it makes its money on the spread of the trade.

Price Waterhouse Cooper's research and analysis indicates that within the next 5 years most exchanges will be electronic in some form. The growth and success in automated, electronic exchanges is driving even the traditional auction and open-outcry exchanges to turn their specialist-driven markets into electronic exchanges.

NASDAQ is upgrading its network to handle a trading volume of four billion shares a day. Implementation of the new capacity technology will begin early next year, ZDnet reported. Trading days of 900 million shares are no longer unusual, for NASDAQ. However, National

Association of Securities Dealers (NASD) chief information officer Gregor Bailor agreed the current system would be "stressed" at a volume of 1.5 billion. "Eventually, the Internet will be NASDAQ'S network," he said, "which should permit trading of eight billion shares daily." Bailor is hoping a test of an Internet-based system will be operational next year. (source: New York Times, 1998)

There is automated, screen based trading at Matif, Liffe and the Deutsche Terminbourse ("DTB"). In fact, the DTB is so successful that Liffe moved up the electronic trading release, and has just announced the closing of their floor and end of open-outcry trading. After the euro is introduced, expect to see more carnage on the Exchange front.

The current merger of the American Stock Exchange (AMEX) and NASD will create a hybrid market that hopefully will offer the best of both worlds – electronic market making and specialist auction. Although NASD, which owns NASDAQ has committed to upgrading the AMEX's trading floors, the rage in electronic trading may eventually push the AMEX into becoming more automated. The agreement between OptiMark Technologies, which will provide order matching software to NASDAQ, will in the next few years include the order flow from the AMEX and even the Philadelphia Stock Exchange (PHLX). The PHLX is close to merging with NASD/AMEX, and it is believed that the PHLX will follow whatever technology the AMEX adopts.

While today's traditional markets are feeling the pressure from pure electronic exchanges, ECNs or electronic crossing networks such as OptiMark and Island are going as far as eliminating the market maker and the spreads that they make. This results in faster trades at lower prices. Island, which is most notably affiliated with Datek, the online brokerage firm, is advertising benefits of lower costs and faster trades to encourage brokerages to send their order through to them. Island hopes that the investor would experience the trickle down effects of lower trading costs. Consequently, investors would prefer trading with brokers who are involved with matching systems. The affect on the market would be increased liquidity and better pricing, both vital to the success of any exchange.

Vendors recognize the value and revenues attached to electronic commerce, and they will develop ECNs that will keep their revenues and their profiles at the levels to which they have become accustomed. Reuters has already realized this through its successes with Instinet and Dealing. Bloomberg continues to move into this market by developing its soon to be released Bondtrader, which will provide electronic trading (hence liquidity and transparency) for the bond market. Bloomberg agreed to give away free terminals to increase the number of participants in its previously released product Tradebook. This may be the route that vendors will follow in order to bring participants to their trading networks.

OptiMark is an anonymous trading system developed by OptiMark Technologies. With buy-in from some of the major exchanges (NASDAQ, Pacific Stock Exchange) and market data leaders to trade stocks using its order-matching software, OptiMark hopes to cut trading costs and increase liquidity in the markets. Tradeweb, a U.S. bond trading system was launched in January 1997 bringing 5 major dealers (State Street Bank of Boston, CSFirst Boston, Goldman Sachs, Lehman Brothers and Merrill Lynch) together with 100 institutional buy-side firms to trade online.

Although some exchanges, including the NYSE, are not interested in cooperating with ECNs (such as OptiMark) because it reduces the role of the specialists, it doesn't change the fact that the market of the future may find its home in consortiums of extranets brought together by the dealers themselves. Some day a sell-side trader will sit in front of one screen that he can log into via a browser that will give him access to trade via three or more ECNs. On the other side of other screens will sit his counterparties. Together they'll be able to view sizes of bids and offers and levels of prices, and they will exercise their trades electronically, and directly with each other.

Commenting on the rise of alternative trading networks, and the changing face of financial services Tower Group analyst Larry Tabb says,

There will be a lot fewer players in the next decade. Plain vanilla products [treasuries and FX] will be traded firm to firm via an electronic market. There will not be the need for as many broker dealers as we have today. They will have to focus on more tailored financial products such as underwriting, Risk management, securitization, and structured products. Super-banks will force mid-tier institutions out, but boutiques, providing specialized services, will proliferate. Retail brokerage will change the most drastically. They will split into purely internet based, low fee trading entities, and those who provide a lot of services for an additional fee. Technology is the main driver for all of this.

## **Straight Through Processing**

### *STP – The Trader's Edge ©*

Straight Through Processing (STP) has become the Holy Grail of the securities operations industry in the last few years. It's no coincidence that the clamor for STP is happening at a time when electronic trading volumes are reaching dizzying heights.

The emergence of ECN and Alternate Trading Systems offers investors several avenues for buying and selling financial instruments in a network based milieu. ECNs are in direct competition to the "open outcry" or auction system that has been in place since the beginning of time. Because of the speed and volume of transactions in an electronic marketplace, it forces the trade process to become much closer to the goal of real-time or near-time settlement.

Although it is retail brokerage firms that are being transformed by this electronic trading surge, institutional investors are also beginning to look for the same type of cost savings on a portion of their order flow. They are implementing standards and protocols that are moving them into a paperless environment and leveraging a new generation of order management systems to get them there. While the hurdles of offering electronic, cross-border trading are understandable and probably difficult to overcome by the Millennium, today's investor is impatient for T+0, T+1 settlement in the domestic financial markets.

How does all of this affect the market data vendors? Well, if you consider the fact that all the players involved in a trade: investment manager, broker dealer, custodian, and clearing agent, have either a Bloomberg, Reuters, Bridge, or Thomson product sitting at a desk somewhere in their organization. This indicates that the MDS vendors are sitting in a very interesting position.

Many of the problems with conducting a trade in a true STP environment are connectivity related in nature. Whose network should connect all the above players and how should they be connected? Dealing with diverse communication hardware and protocols has always been one of the bottlenecks in IT project management. Having the same hardware and software, supplied by the market data vendor, among the various sources and destinations will make it a lot easier to connect the dots. In addition, a secure Extranet can connect the market data vendor to the customer.

This kind of infrastructure also solves problems related to price and monitoring. If communication between the customer and the market data vendor is already ongoing due to the delivery of market data, then the vendors could in effect simply become the toll takers in this STP environment. If complex entitlement processes are already in place at the vendor's server level to control the release of market data, why wouldn't the movement of data from one point to another simply be considered another service to be entitled?

Market data vendors already have in place centralized databases and monitoring facilities that can track the status of a message and maintain its state. After all what's the difference if the message is a quote or an order? This monitoring of the flow will enable all the trade participants to gain access to the trade in a multi-lateral fashion, instead of the current linear approach.

The vendors would not be able to do this alone. A hand-off of data will have to occur at some point in the process to a Swift or Swift-like bank payments network.

Don't think that the vendors haven't noticed. At last count Reuters owns several order routing and related systems in production at various exchanges and firms around the world. Bloomberg has Tradebook and its alliances with BNY-ESI (a wholly owned subsidiary of the Bank of New York). Thomson has their own suite of products including OASYS. Bridge has the IOE/2 order entry system and EasyFIX, their server and routing network.

Of course, there are some downsides to this approach. Once the vendors become an integral part of the trade process, firms will be less likely to change vendors and thus, might lose any negotiating advantages they have today. Also it is possible that some of the buy-side order flow would be directed away from the brokers and dealers and sent instead to an electronic matching system.

Even as Wall Street has enjoyed one of its longest Bull runs ever, market data vendors' revenues have been stagnating over the past few years. To a certain degree, the Internet has contributed to this decline by causing market data to become a heavily commoditized item. The emergence of STP and Electronic Trading, however, has many market data vendors setting their sights on new and broader horizons, thus staking out their turf in the lucrative order and execution routing process.

## The Impact of the Internet on Market Data

### *Data and Revenues*

“Net communications” is the newest buzz-word. The growth of the Internet as a vehicle of communication and information exchange is forcing market data vendors to approach their future business from a different angle than they have in the past. They are making a big Internet push, driven by the ease of delivery and lower costs, objectives which are favored by both clients and vendors.

Market data vendors have traditionally been providers of exchange data, analysis, news, and research. They have competed for clients based upon the timeliness of delivery and quality of the data. Their clients, the big financial institutions, however, will not necessarily do business with them based upon their past reputations as data distributors. We are in the midst of a technology revolution that will completely re-align the needs of financial services companies and the market data vendors who serve them.

According to Andrew P. Delaney, SVP at Waters Information Services (source interview 10/98),

*Internet delivery of market data is becoming the accepted form of delivery for the Wall Street user community. A vendor's future success depends on how quickly they accept this fact. The real value added will be in private networks. Professional users will require reliable and secure private networks based on Internet technology. Non-professional users, such as retail investors, will continue to use the public Internet. We are seeing the content as becoming separated from the delivery mechanism. In the future, market data vendors will specialize in creating the content, and leave the delivery to network providers.*

This change is driven by several factors. The Internet is providing the technology standards that will deliver data in a cost effective, easily accessible network. Each day the Internet is closer to overcoming its technical uncertainties. There remain valid concerns about the Internet. These concerns include:

- Stability
- Reliability,
- Security,
- Speed of delivery,

- Bandwidth limitations to provide for these new services,
- No standard protocol for distribution of real-time data, and
- No capability to retrieve and view different data on one screen.

Those that are put-off by these issues are overlooking just how far the Internet has come in its few short years of commercial exploitation. Also, overlooked are the successes of many companies that have exploited the advantages that the Internet offers. A full 20% of all individual investor stock transactions now occur over the Internet. This pace will not abate, rather it will continue to grow exponentially, driven by investors' thirst for information, and financial services companies' cost cutting measures.

### **Changes in Financial Services Industry**

If we look back 10 years, we'll see that demand for market data in financial services was driven by the transition from video based data to digital data. Financial services companies wanted the ability to service their user community without having to purchase proprietary hardware from each vendor. Data feeds were invented so that information could be delivered over one line to a server located at the client's site, which would in turn broadcast data to hundreds of users. Additionally, banks and brokerages had the ability to control their users' permissions internally, lowering overall costs.

Client/server technology and LAN and WAN connections gave users from different locations, internally and/or externally, access to the same information at the same speed. All of this resulted in lower market data, telecommunication and infrastructure costs. The most recent improvements, such as object oriented displays and Java based applications, continue to prove that the market is still driven by the desire for lower costs, less hardware on the desktop, and above all, the desire on the part of the user to tailor the data they receive.

The financial services industry has consistently told the vendors "I don't need all of your data, only subsets of it, and I don't want much hardware on my desktop." These same efficiencies are driving the development of the Internet as the main vehicle for the transmission of data, and its delivery today.

### **Critical Importance of Infrastructure**

Today's equipment that handles packet-switched data, circuit-switched voice or other wireless protocols will be replaced by an infrastructure that will integrate them all over one communications network. This network will originate from fiber optics, copper and airwaves within the next 3-5 years. Many believe that photonics may supercede today's switching technology to provide for the high bandwidth demands of the Internet. Photonics, also termed optical switching, is currently being explored as the next generation of data delivery. Information is transferred as packets of light, which has been shown to travel faster than the transmission of traditional switched packets of data. In addition, companies such as Juniper Networks of Mountainview, California are developing routers for the Internet's backbone to deliver data faster over internet protocol (IP) networks.

Further, the expensive networks that the vendors have put together to distribute the data continue to cost the vendors more and more. Some vendors are seeing the telecommunication usage escalate by 50% per year, while their telecom costs escalate at 30% a year. This untenable situation will drive the major vendors to immediately embrace Internet standards to deliver their data, and to outsource their network infrastructure to global telecom providers within the next 3-5 years.

Use of Internet based technologies dictates that much of the technology that was once located at the client site is no longer necessary. Many start-up Internet market data vendors are confident that the delivery of data, analytics, pricing, and historical data will be timely and secure due to such advances as photonics, terabit switch routers, encryption and firewalls that will keep speed and security in sync with the Internet's expansion. The advantage to both clients and vendors is that a user can access the data they require from any workstation in any location around the globe through a simple browser.

Server and database technology has also improved to the point where a user can query for and receive only the data they need. As a result, costs for both data and technology will continue to decrease. Companies such as MoneyLine Network and Capital Management Sciences are setting the stage for this now.

MoneyLine aggregates data sources and tailors them to their clients needs. Their customers receive only the specific data they require, rather than receiving all the data affiliated with each market. To quash security and communication concerns, MoneyLine uses RSA encryption techniques. Capital Management Science's Insite product provides dynamic updates from all markets segments, intraday and interday historical charts along with analytics, technical analysis, research, news and fundamentals. Insite is being marketed to institutional investors as a more easily accessible and economical solution than other dedicated services for their market data requirements.

The financial services industry is rushing to join the Internet as a communications and commercial network. Online trading is transforming the brokerage business, with firms such as Ameritrade, E\*Trade, Waterhouse Securities, Quick and Reilly, Datek and DLJdirect, giving retail investors direct access to markets. Market data vendors provide the quotes and online brokerages provide the trade execution.

Salomon Smith Barney has just introduced WorldTrader, their venture to trade directly with medium to small size institutional and brokerage clients. The product is accessed via a Java-based Internet browser, thus reducing costs incurred to only trading fees and Internet access.

## **Commoditization**

Market data is a commodity. Access to market data is becoming pervasive and commonplace. Electronic trading is growing significantly. These factors continue to pressure the market data vendors into reassessing their traditional services. Many vendors are offering services that use Internet technology to gain clients' business loyalty and reliance now. Bloomberg is preparing

to launch Bondtrader, an electronic trading network for U.S. Treasuries. Standard and Poor's Comstock has released Xpresso which is a new application using Java technology for delivering Comstock's real-time quotes, fundamental data, news and research. In addition, Fame Information Services is supplying historical pricing data for fixed income, equities and some derivatives markets for delivery via MoneyLine. It is increasingly obvious that with all the new technology, clients will no longer pay a premium for data to the big vendors just because they deliver data the traditional way.

Although vendors may not intentionally be driving the change to their traditional business, they too are responsible. Data is becoming a commodity due in part to their strategic alliances with the electronic commerce industry. In order to attract interest in their site, online brokerage firms are providing information such as research reports simply for the cost of being a subscriber. Customers that trade with Charles Schwab over the Internet have access to Standard & Poor's analyst reports. E\*Trade customers have access to BancAmerica Robertson Stephens' research reports along with First Call's analyst earnings projections.

Vendors today are using this competitive strategy to give their data exposure to many subscribers for one overall fee paid by the brokerage company. But in the same vein they are making their data a commodity, and their traditional business less competitive. There are also benefits to this change in identity for them. Delivery of exchange data is not a revenue producing service for vendors. In addition, clients have been unhappy that they are charged twice for the same data if accessed over different vendor networks. Thus, delivery directly from the exchanges or by a data integrator would benefit everyone. The exchanges would still charge a fee to each user and the vendors would be relieved of the maintenance and invoicing.

As the current infrastructure wears down, and new technologies increase Internet stability, it will be interesting to see how vendors will work out their pricing and delivery of information while at the same time addressing the financial services industry's push for lower costs and wider distribution.

In the near future we will see vendors offer their flagship products as Internet applications, such as Bloomberg's fixed income analytics, First Call's earnings projections, and Fame's historical pricing data. Real time data will be available online through companies such as MoneyLine and Capital Management Sciences.

Therefore, in order for vendors to see the same high revenue growth they saw in the earlier days of information delivery, they will need to become a facilitator to the already high growth electronic communications or crossing networks (ECNs). Or maybe even buy an exchange...!

### **Y2K, Decimalization, T+1**

As market data vendors and their clients, the banks and brokerages of the world, rush to prepare for Y2K, lets take a look beyond that deadline and see what waits beyond the turn of the millenium. The year 2000 is a drop dead date that all businesses must be prepared for, or risk failure. It is the climax of 60 years of software and systems development. But with all the millions of lines of code out there, do we really think that everyone will be ready – Or are we

just kidding ourselves? Certainly there will be financial businesses that will fail due to the Y2K problem. The SEC has already censured and fined brokers for not reporting their preparedness. With 3000 brokerage firms and 9700 banks in America today, can we really say with determination that they will all be functioning properly on January 1, 2000?

From the battlefield comes the medical concept of “triage,” or separating the wounded into three groups: those that needed immediate surgery, those that could wait, and those that would certainly die of their wounds. Y2K technologists are also practicing triage. Some critical systems need immediate remediation or replacement, some can wait, or be worked around, and some will be left to die.

And what of the dénouement? After the clock turns at midnight, December 31<sup>st</sup>, 1999, we will find out what will work, and what won't. We will all breathe a sigh of relief that (hopefully) the important systems work, that brokering and banking can go on, that our financial infrastructure is secure. We will congratulate ourselves for getting through that mess of code. But what about all those work arounds? What about all those failed systems. Now that we have the time, won't they need to be fixed? Frankly, there is going to be just as much work to do after Y2K, as there was before it!

So what will be the Y2K impact on market data, and how can we be prepared? The following is some practical advice on contingencies to prepare for and pitfalls to avoid while excising the dreaded Millennium Bug.

Most Y2K testing involves running applications with all system clocks set to one of a number of high-risk dates (including, but not limited to, 12/31/1999, 1/1/2000, 1/3/2000, 2/28/2000, 2/29/2000, 3/1/2000). Why are these the high risk dates? 12/31/1999, the day before; 1/1/2000, New Year's Day...; 1/3/2000, the first Monday; 2/28/2000, 2/29/2000, and 3/1/2000, yes, the millenium is a leap year!

For applications that receive data, such as realtime market prices supplied by outside vendors, coordination is one of the most difficult tasks. Not only must testing be orchestrated in a way that assures that all internal systems are set on the same date, dates must also be coordinated with outside sources, many of whom are operating on different testing schedules. For example, one market data vendor repeatedly cycles test data through the same series of high-risk dates every week. But if this cycle doesn't match your schedule, you may not be able work with the vendor-supplied test data.

The solution, therefore, is to create a special application that simulates the vendor's data, while allowing your test teams to control the date-related information. However, even gaining control of this one piece doesn't solve the entire puzzle. In a large enterprise, testing schedules for different internal groups - client server, mainframe systems, etc.- also have to be synchronized. If one system fails during testing, contingency plans have to be in place to ensure that the test continues, or that there is sufficient time and resources to repeat the test at a later date. All of these factors necessitate a high level of planning and coordination.

The construction of a Y2K test lab is another element that requires careful planning. Because of the number of applications to be tested, it's best to divide the lab into several time realms, each of which can be set to a different high-risk date. This permits simultaneous testing of a number of high-risk dates, and can help with the coordination problem discussed earlier. In addition, one realm in the lab should be set to current time to handle the collation of results and other administrative tasks.

However, even after taking the number of applications and dates to be tested into account, there is another factor that should be added to the mix. In any large enterprise there are hundreds of applications being used, many of which may not have been included during initial test planning. Once a test lab is in place, user communities will learn of it, and applications will emerge from the woodwork. While applications can be excluded from testing by performing a kind of triage to eliminate all but the most essential, some will have to be added to the test schedule. Although it is difficult to plan precisely for the "X- factor," one should keep it in mind when specifying the size and capacity of any testing facility.

Finally, though everyone knows that the Y2K problem is serious, this fact has to be constantly re-emphasised. Typically the testing and remediation of applications-especially proprietary legacy systems — requires support from development and operations staff. But these resources are already heavily taxed by their day-to-day responsibilities. Also, when serious problems occur, keeping a business running is, and should be, the top priority.

However, even at this late date, January 1, 2000 can seem a long way off, and it is human nature for people to put Y2K work aside when other work seems more pressing - even if their other projects do not involve business-breaking situations. Since the lack of support at crucial times can wreak havoc on a Y2K testing schedule, it is important to ensure that senior management's imprimatur is firmly fixed to any Y2K program. Clearly, management can also help by approving additional resources, but it is essential to success to repeatedly make clear to everyone up and down the line that this issue is a top, firm-wide priority.

After Y2K, if there really is an "after," financial service firms will be faced with T-1 (trade date plus one day settlement) and T-0 (continuous settlement) projects. Many firms have said that based on their experience in the early 1990's of going from T-5 to T-3, this should not be much of an issue. The problem is that T-3 still gives firms a lot of flexibility. Many clearing and settlement shops still have a large proportion of manual intervention. With kick-outs and DK's (literally "Don't Know" trades) running at 3%-5% as an industry benchmark, T-1 and T-0 will only magnify the problem. Clearly, STP is the only solution to this vexing problem. STP, in its many forms, (as discussed above) is not that easy to implement

## Conclusions

So how does the euro play into the changing face of business and world financial services? Here are some answers in summary.

- The euro changes everything from business strategy through technology and operations. The euro will bring about a total re-alignment of the European banking and finance industry. Agile, liquid competitors will win out over established, though technologically rigid companies.

- Convergence, Consolidation and Globalization are re-shaping the world's financial institutions. First the euro, then Y2K, then decimalization and T+O. Technologists and business strategists will be busy for a long time to come.
- The Internet and its standards based related technologies are changing the way financial information is distributed, as well as changing the nature of the relationship between vendor, client and the exchanges.
- As financial service firms consolidate, pressures to contain costs remain at the forefront. Vendors feel the pinch as they are asked to provide more data at a lower cost.
- The traditional roles of the Exchanges are eroding as automated trading grows across private networks and extranets. Open outcry, auction and specialist markets are at risk of becoming obsolete in the face of screen based trading.
- Major realtime market data vendors are seeing their network operations costs and volumes escalate. The likely strategy they will adapt is to outsource their networks to major telecom providers, while concentrating on high margin transactional based trading systems, and ECN's.
- STP and ECN are redefining the role of traditional exchanges, and may lead to their marginalization.

It looks like it is going to be an interesting decade ahead of us!

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