

# Housing Finance and the Role of Technology: Innovation Abounds!

by Richard Beidl

While the North American mortgage industry has historically been slow to adopt technology, the last five years have seen a dramatic increase in the number of new technology providers and high-tech originators. Over the last 15 months, with the slowing of the global economy and the dot.com meltdown, we have seen a dramatic reversal of this recent trend, with both newer and traditional technology providers falling by the wayside. Those that survive will change the way the industry landscape looks, and they are taking their vision to the rest of the world.

As the center of attention for technology providers and consultants, lenders often find themselves torn between the technology evangelists and prognosticators on one end, and the fundamentals of real-world lending, cultural and budget issues on the other. Even if a technology is "revolutionary," for many lenders this is not enough. There is an expression in the United States, probably on

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par with a Chinese proverb, that states: "If it ain't broke, don't fix it." While simplistic, there is certainly logic in this saying. Lenders have too often invested heavily in new technologies, new processes, new channels, etc., without a real return on investment (ROI). In an age of increasingly global competition, investments in information technology (IT) must be made as strategically as any other investment, and the mortgage business offers an increasing array of options for the strategically minded bank.

## MAXIMIZING TECHNOLOGY'S VALUE

The mortgage business tends to be far more volatile than any other consumer banking business. Loan volumes can rise and fall dramatically from month to month and year to year, tied very closely to the micro-economy, the macro-economy, interest rates, home prices, the inflation rate, the economic outlook, and even changes in national tax policy. In North America, the matter is even worse since heavy refinancing (re-mortgaging) can add significantly to volume volatility.

The paradox then is that during slow periods, when changing processes and technologies are preferred, budgets tend to be restricted because revenue has declined. During active periods the budget is available, but making major changes is like trying

to change the tire on an automobile traveling at 100 kph. Timing is never optimal, so the decision to make a change must be well thought out, have significant implications, and have quantifiable (not just financial) results.

For example, how many banks have invested in customer relationship management (CRM) and are still trying to determine what, if any, value they have received from it? Does this mean that CRM's value is questionable? No! It means that the bank must understand the value and role of a technology before it takes the plunge. It must understand and determine what the measurements of success will be, and be willing to make the organizational and process changes that leverage the power that technology can provide.

Across the North American mortgage industry, technology has finally become an integral part of the mortgage business, and banks are agonizing over a plethora of decisions, where once there were few (or none). In Europe, Latin America and Asia, the trend toward increased use of technology is similar, though much of the new technology is being developed internally. However, this is changing, and banks around the globe are increasingly facing the challenge of choosing between numerous packaged software

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solutions. If just choosing the best solution were not complex enough, banks must now examine the economic viability of the provider—will they be around to service and support the solution?

Now that we have set the stage, let's jump right in to discussing some of the interesting technology trends that have surfaced in the U.S. over the last few years, and attempt to draw some corollaries between the U.S. and other regions. We'll also take a glimpse into the future to gain some insights into the future role of technology in the origination of mortgage (secured residential housing finance) loans. After all, while it is interesting to explore the trends and developments that are occurring all around us, it is more meaningful to understand those that will truly propel us forward, rather than those that will be distractions along the industry's evolutionary path.

## FOCUS ON TECHNOLOGY

We begin by dividing the industry landscape into manageable segments (see Figure 1). At the highest hierarchy level we have two major segments: originations and servicing. To cover both of these segments exhaustively is beyond the scope of a single article, so we will only focus on the originations areas (which we refer to as classes) listed.

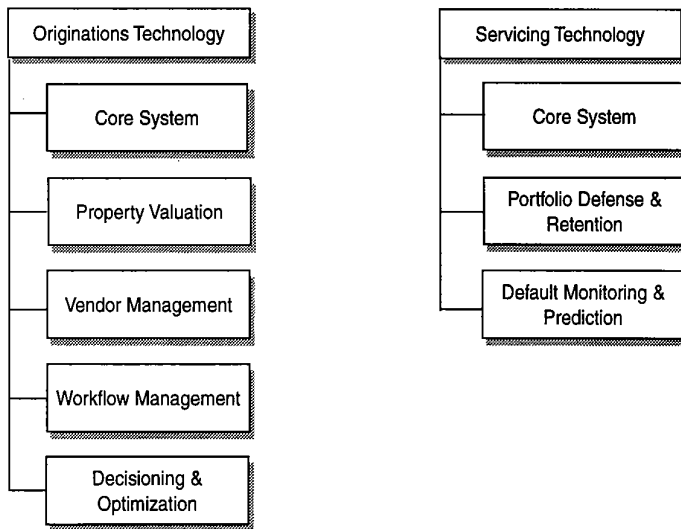
We begin by taking a brief look at the evolution of core systems in the originations segment, and then examine four additional key technology classes that support originations: property valuation, vendor management, workflow management and finally, decisioning and optimization. Though we discuss these five areas as separate classes, they can be a part of the core system; separate systems, or may each be offered as outsourced services. Taking this

one step further, they may be separate vendor technology solutions, internally developed applications, or as a combination of these as well. In other words, these are truly classes of technology, not necessarily independent software applications, and there are no rules—or even best practices in many cases.

In a future article we will turn our attention to the servicing world, and focus on three servicing technology classes: core systems, portfolio defense and retention, and finally, default monitoring and prediction.

While we focus most heavily on the U.S., as we discuss in the next section, the independence of the world's regions is diminishing, and trends and technologies often begin in one region and quickly spread into other regions—a result of both globalization and the evolution of the Internet. Globalization is a function of not only the global nature of funds sourcing via securitization, but also of the consolidation of financial service providers and their global expansion (e.g. ABN AMRO, Wells Fargo, GMAC-RFC, Citigroup, Countrywide, National Australia Group, etc.).

Figure 1. Core Technology Classes



Source: Beidl & Associates

## A QUICK OVERVIEW OF THE U.S. INDUSTRY

While technology has been a fundamental part of the mortgage servicing business for decades, it did not become a fundamental component of the originations business until the late 1980s. In fact, many lenders maintained purely manual loan files well into the 1990s, using minimal technology for processing loan applications.

Three major factors contributed to the escalation of the use of technology in the U.S.:

- First, the growth of packaged loan origination systems and industry-standard automated underwriting (AU) solutions in

the U.S. in the early 1990s ushered in the era of increased technology interdependence. Lenders needed to pass electronic data to the AU and other systems, and packaged solutions provided a platform to collect, track and exchange data, and at a lower cost than could be achieved by internal development.

- Second, the mortgage lending business has never been a high volume business relative to other types of consumer lending. In the U.S., the number of new mortgage loans each year is less than 10% of the number of new credit cards and less than 17% of the number of new automobile loans. Unlike credit cards and auto loans, however, which are based mainly on credit scores and ratio analysis, mortgage loans require significantly more data, and many more processing tasks to complete. Thus, automation became necessary as volume increased. Workflow and task management became valuable tools for administering government and investor reporting, pipeline risk management, interest rate hedging and vendor management.
- Third, in the early 1980s, interest rates entered a period of increased volatility. This affected both the volume of new loan applications and the volume of refinance applications, both of which are interest-rate sensitive. As loan application volume began to fluctuate wildly from year to year, most directly due to the refinance business, lenders had to constantly adjust employment levels. A highly manual process, combined with a highly volatile flow of business, caused industry employment, and profitability, to fluctuate dramatically.

Increasing the use of technology allowed lenders to begin to reduce the level of manual processing and increase the scalability of operations. We can witness this effect by

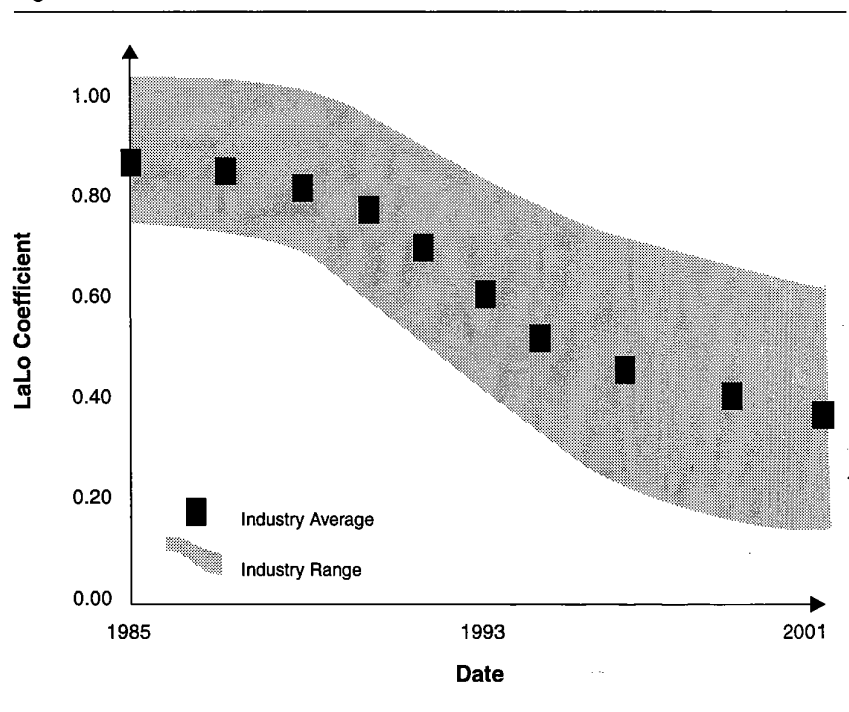
observing an important proxy benchmark for the effectiveness of technology in reducing the level of manual loan processing—the labor-to-loan (LaLo) coefficient (Figure 2). The LaLo coefficient provides a measure of the scalability of a loan processing operation, and is (usually) less than one. Mathematically, it is a derivative—the change in staffing level with respect to a change in processing volume.

To illustrate, in the mid-1980s, an average processing department would require an increase in processing personnel of 85% if loan volume spiked up by 100%—a LaLo of 0.85. Today, the most efficient institutions would argue that their LaLo is at, or near, zero. However, we have observed that a more probable number industry-wide is

closer to 0.4, with the most efficient firms having coefficients in the 0.15 to 0.20 range. While not quite zero, this achievement is significant. An interesting observation, supported by the graph, is the increase in the variance over time—a measure of how spread out a distribution is, or mathematically, the square of the standard deviation. This increase reflects the fact that larger banks have been able to make greater investments in technology and amortize these investments over a greater number of loans.

It is important to realize that additional factors other than technology have had an impact. For example, a reduction in the number of processing tasks, the introduction of streamlined processes and the acceptability

Figure 2. Labor-to-Loan Coefficient



of alternative documentation have all had an influence. Though technology has been the single greatest factor, it is not the only one.

In short, technology has become a critical component of the global mortgage industry. While it is not a panacea for the industry's fundamental challenges, it is a critical component of the underlying structural changes that are occurring globally.

We do not for a moment suggest that the North American mortgage industry is the example to be followed, either in process or in technology. However, the sheer size of the industry, particularly in the U.S., has given rise to significant innovation not seen elsewhere in the world. Despite this innovation, the challenge in taking technology solutions across national and regional borders has always been the differences in basic operating requirements, not to mention differences in product sets, culture, credit policies, decision criteria, investor reporting, funding, etc. Great solutions are usually great because they are tailored, or tailorable to the needs of the target market. Thus, a solution built for one market has often found itself irrelevant in others.

Newer technologies, including newer software languages, enterprise databases, open exchange standards and common operating environments, are beginning to influence the very nature of development, and are helping to overcome some of the limitations of legacy applications.

In the U.S., the greatest opportunities for operational efficiency are in the originations business. While great efficiency opportunities do exist for originations in many countries, it is true that greater efficiency opportunities often exist in the servicing business in most European, Latin American and Asian countries. If we look purely at a cost comparison, the U.S. has one of the highest

costs of originations due to the complexity of the process and the structure of the industry. In servicing, however, U.S. lenders are among the lowest cost servicers in the world. The greatest innovation and investment in information technology (IT) is occurring in originations, however, and this is where the greatest number of new vendor products is focused. Let's examine the areas we identified in the "Originations Technology" section of Figure 1.

#### CORE SYSTEMS

Core mortgage systems, or loan originations systems (LOS), are the heart of the mortgage production system. They are essentially a database with an exhaustive set of interfaces to other systems (internal and external), and tool sets for managing tasks, reporting, tracking, credit decisioning, etc.

The LOS has evolved rapidly over the last decade, and as new technology providers have developed complementary technologies to support the LOS, LOS vendors have slowly incorporated these additional technologies into their core systems—creating an integrated platform. Microsoft Windows® is an excellent example. A decade ago, Windows was an operating system, and media players, web browsers, file viewers, communications programs, games and many other applets were separate components. As Windows has evolved, many of these applets have been incorporated into Windows' core functionality. While this has been bad for the providers of these add-on applications, it has been beneficial for consumers who now have a more comprehensive solution in a single product.

#### THE NEW CORE SYSTEM PARADIGM

While the last few years have focused on the integrated platform, a few LOS vendors have made the decision that the evolution in modern software languages, operating system

platforms, databases and even the Internet, have provided the necessary ingredients to create a whole new packaged solution for the modern environment. Prime examples are London Bridge Software (LBS), based in London, England, and Interling (ILQ), based in Bellevue, Washington, in the U.S.

London Bridge and Interling are developing entirely new, "from the ground up" origination systems that are built on entirely new application frameworks, using N-tiered browser-based technology, newer development languages and environments (Visual Basic, C++, Java, etc.) and incorporating some of the key strengths of the Internet. These solutions are open (easily integrated with), Microsoft technology-based, use standard enterprise databases like Oracle and Sybase, and are highly secure and scalable.

The fundamental design of these two solutions allows them to be flexible in handling many of the issues that differ between countries and regions. For example, loan data can be sent to external decisioning systems, investors or to an internal rules engine. This allows U.S. lenders in the U.S. to send loans to Fannie Mae for approval while a European lender might send the data to their internal HNC Capstone system. New products can be more easily set up using the database tools and incorporated into the various user screens. The systems can include both real-time connections to the central server for branch originated loans or use wireless technology or dial-up connections for remote locations. This can significantly reduce pricing and rate locking errors.

Management and investor reporting is simplified through standard report writing tools like Crystal Reports and include the power of the inherent database toolsets to create ad-hoc or additional standard reports. Want to see production by loan officer, source, processor, region? No problem!

Integration with other partners and systems can be accomplished through DLLs (dynamic link libraries), through direct hits to the database, or data exchanges using HTML, XML or any other desired open or proprietary exchange protocol.

If these reasons were not sufficient, implementation, upgrade, training and maintenance all benefit from this new architecture. Being browser-based, most users already understand the user interface, and can move between pages, data sets and accounts easily. Upgrades and maintenance are all centralized since the application is server resident, not client resident – no need to visit every terminal to upgrade hardware, check for compatibility or install software fixes, upgrades and patches. As an N-tier application, the business logic, the database, and the user interface are all separate layers, providing increased scalability, flexibility and control, as well as greater security. Additional tiers can be created or the application can be modularized to provide different access and functionality for different user types: retail, wholesale, correspondent, etc.

#### **THE CORE SYSTEM OVERHAUL**

While LBS and ILQ are focused on redeveloping their core systems from the “ground up,” several firms are focused on “Internet enabling” their solutions. This has been the approach of choice for most U.S. and European vendors, and even for most banks around the globe that have significant investments in internally developed systems. Two notable exceptions are worth discussing: Alltel, based in Jacksonville, Florida; and Countrywide Home Loans, based in Calabasas, California. (A third notable firm would be Electronic Data Systems.)

Alltel has two significant evolutions occurring within its core LOS systems. In the U.S.,

in April 2001, they acquired the rights to Policy Management Solutions’ Cybertek software. Alltel has spent the last year taking the best of the Cybertek solution and working to marry it to the best of the Alltel-developed components in an effort to realize some of the promises of the Cybertek system that never materialized. The second initiative has occurred in concert with their Bradford and Bingley relationship in the United Kingdom. They are developing a servicing and LOS system that will be appropriate for the U.K. market and include flexibility to serve the diverse product, reporting and process needs of the European market. Like the Dutch company, Stater (part of ABN AMRO), Alltel is focusing on providing its new technology as a service bureau, and it is uncertain whether the technology will be available for licensing.

Countrywide has partnered with U.K. lender the Woolwich (now owned by Barclay’s Bank) to create Global Home Loans (GHL). Countrywide, who is developing the technology for GHL (which licenses it from a subsidiary), has always been a “proprietary shop,” meaning that they develop and maintain most of their technology internally. As a leader in online (Internet-based) originations in the U.S., and with one of the lowest costs of loan acquisition and servicing, Countrywide is well positioned to have a major impact on both the U.K. market and on Europe as a whole. Like Alltel, they have focused heavily on taking their existing technology and re-architecting the core system in order to make them appropriate to foreign markets, and to make electronic and mobile commerce integral to the new system. Also like Alltel, they have had to incorporate additional flexibility into their system and their database to accommodate differences in loan products, reporting and process.

The GHL experience has been somewhat unique given the distinctive products that the

Woolwich has created. The Woolwich’s customer management and retention strategy has led to an innovative product structure where loans, depository accounts and even equity accounts are interrelated and even interdependent. Similar to Virgin Bank’s Virgin One account, the Woolwich product may provide a customer with a home loan that includes elements of a traditional loan, a non-amortizing loan, and a check-access equity line. The challenge of creating an LOS and servicing system that incorporates features from several traditional systems is a daunting one.

Developing systems from the ground-up or from existing core technologies each has its own challenges, and all of the aforementioned firms have experienced challenges. Both Countrywide and Alltel have successfully deployed their technologies on a large scale, but both struggled to migrate older technologies to newer platforms, and to integrate them with newer technologies, and then to incorporate features and functionality that were never intended to be in the original system. In most cases, firms taking this approach are mixing mainframe technologies with Internet or client-server technologies where they achieve the greatest benefit from each. However, where many vendors and lenders have simply “Internet-enabled” their technology, Alltel and Global Home Loans have focused on “re-architecting” their technologies to make the Internet—and some of the new interface and feature capabilities integral parts of the technology—not just “add-ons.”

Interlinc and London Bridge have the challenge of transferring years of development, experience and innovation in their existing technology into new systems that will be as feature-rich and as stable as their existing systems. In addition, in some cases they have sought to push the boundaries of process evolution, but have had to do so while maintaining support for legacy systems

and processes. For example, a purely browser-based system may sound "cutting-edge," but LBS and ILQ have both recognized that there are many "real-world" situations in which a purely browser-based system is impractical—should a broker not be able to take an application if their ISP is down? In addition, any system—new or re-architected—will experience a period of fine tuning. The more complex the application or "system of applications," the greater this challenge.

#### NEW CHANNEL SUPPORT

We have discussed the Internet as a new delivery and interface channel, but new channels will continue to evolve slowly, some based on existing infrastructure, and some on evolving technology. For example, automated teller machines (ATM) are being used by some banks to interface with customer information files and decisioning systems to deliver customized offers and programs to customers during an ATM transaction. ATMs are only one option, and this same interaction is being deployed through online banking as well, often using the same infrastructure for everything but delivery.

Eventually, the evolution of mobile banking will allow for additional client interaction, not just information delivery, and core systems will need to accommodate these additional channels. It is possible the newer "broadband" technologies will allow users to create customized and interactive user profiles and be marketed over secure Internet channels based on customer information files, customized profiles and newer "personalization" engines. While many of these capabilities are new and beyond the planning stage for most banks, application vendors have begun thinking about the endless array of possibilities, and creating technologies that will allow the business to support any future interface, interaction and distribution mechanisms that may evolve.

#### PROPERTY VALUATION

The greatest innovation in property valuation continues to be along two lines. In some European countries where property tax records are constantly updated and "marked-to-market," lenders are building interfaces to the taxing authorities to capture property valuation information nearly instantaneously. This data can be combined with a streamlined "drive-by" inspection to verify property condition. In the U.S., this paradigm is possible in only a few geographies, and thus statistical valuation has become the key trend. Though much more heavily used on the West Coast of the U.S. than anywhere else, statistical valuation (using an automated valuation model), combines market data, the property's historical price, and recent sales activity, to estimate the current value of the property.

As in Europe, this valuation is often augmented by an onsite inspection using a streamlined valuation process which is designed to insure simple, but critical elements of the valuation, such as: does the property still exist, it is in good/habitable condition, are the house and the land of the size indicated in the database, and are there any material changes to the neighborhood that would affect the homes value or desirability? If the appraiser (valuation agent) arrived at the property to find an active oil well in the back yard, that might be a great thing – depending on who owned the mineral rights. This is an area in which mobile commerce will have significant use.

While statistical valuation will likely be the main focus of evolution in property valuation, other valuation options have been discussed. For example, the evolution and commercialization of high definition satellite imaging and global position satellites may allow for a system of satellites to take low-altitude pictures of a subject property from two angles to determine property and neighbor-

hood condition. Such systems are already in use for geographic mapping, national defense, and even for weather and geological research.

#### VENDOR AND WORKFLOW MANAGEMENT

Because of the nature of vendor management and workflow management, we will discuss these together. While they are separate, they are closely linked. Vendor management refers to the management of interactions with external (third-party) providers to the home loan application process. For example, obtaining the valuation from an external provider, ordering insurances, obtaining loan approval from an investor, etc. All of these activities fall under vendor management. Workflow management (or process management) incorporates vendor management, but is also designed to manage the overall process at a higher level—from application to funding.

Vendor management is one of the areas whose importance varies significantly among geographic regions. Because of the number of vendors (or third parties) involved in the processing of a loan application in the U.S., vendor management is a critical element of U.S. technology. Vendor management is slowly being incorporated into core systems, and the evolution of the Internet has made this easier. A typical loan application in the U.S. will include numerous third-party providers, including:

- automated underwriting system
- investor
- appraiser (home valuation)
- surveyor
- mortgage insurer
- closing agent

- title company
- automated valuation model provider
- attorney

In the traditional world, the loan processing agent would phone, facsimile or e-mail the provider, and then follow-up manually until the required components were received. The delivery of the required component might be electronic, facsimile or physical delivery. Vendors frequently missed promised delivery dates, necessitating a follow-up contact. This traditional vendor management process typically added several hours to the manual cost of processing a loan, and often delayed the approval. As an increasing number of vendors have adopted technology, electronic ordering, follow-up, and delivery have become increasingly routine.

In the early days of electronic vendor management, several electronic provider networks (EPN) surfaced. These firms provided a common platform to which all lenders and vendors needed to establish only a single interface. Once established, the bank could then interact electronically with any vendor in the network. In 1997, there were no such EPNs; but by 2000, 14 such mortgage and home equity related EPNs had surfaced in the U.S. As Internet usage and comfort has expanded, however, the cost of building direct interfaces has declined and few of these networks remain.

It is clear that these networks were interim solutions. Many of the capabilities that these networks provided became increasingly incorporated into core systems, which is the likely long-term solution. As the European market continues to consolidate and the process becomes increasingly standardized across the continent, it is expected that third-party vendor management will become an increasingly important part of the European market—but probably not for several

years. Europe will likely bypass much of the evolutionary path that the U.S. has followed, and several of the U.S. core system providers are positioning themselves to be there when the need arises.

All core systems now have some level of workflow management, and for the most part, the better systems are fully workflow enabled. The challenge in workflow management has always been the fact that when tasks are assigned to an external system, the workflow system cannot monitor the status of the task completion, only request updates from the external system or provider. The increasing integration among systems, and the increasing use of the Internet is allowing some systems to directly link together so that a core system can generate a task to an external system, and the workflow system can actually monitor the progress of the task completion and even escalate the task if a deadline is approaching or is missed.

Filenet, a U.S.-based global provider of industrial strength workflow and imaging technology, has created an Internet-based third-party workflow system that is specifically designed for managing the mortgage loan process. Pegasystems, a technology provider based in Cambridge, Massachusetts, has productized their own custom workflow solution, and while they have focused more on the servicing side of the business, they have made global inroads into the originations side, as well.

ILQ has taken their state-of-the-art Flowman component and branded it as a separate product. Flowman is a graphical workflow tool that allows the user to create numerous process flows based on any criteria (loan type, loan amount, loan-to-value ratio, etc.) and designate the process steps, personnel or departments, that should handle each step. Rules can be specified to handle any process exceptions, special requirements,

and specific vendors, and then monitored and reported when exceptions occur.

#### DECISIONING AND OPTIMIZATION

One of the most exciting evolutions in lending technology is also one of the evolutions with the most universal appeal—decisioning. In the U.S., the Internet-based integration of lenders and vendors has given rise to a new optimization process, which never existed in the traditional lending world. New technologies from U.S. firms like ARC Systems, HNC, Keystroke, and Mindbox and the French firm iLOG, now allow consumers to input their basic data, needs, and financial details. The technology can then retrieve their credit files and then match that information against the lender's product and pricing grid, including hundreds of product iterations, lender products and guidelines and even product combinations (across lending groups). Based on this optimization process, these technologies can provide the optimal match of the product to the borrower, and meet the needs of the borrower and the bank.

These decisioning engines have different capabilities with regard to both the type of decisioning they are capable of, and the way they are integrated. Some of these engines can even manage the loan approval and ensure that the loan is processed as required by the investor's credit policy, and according to the specific requirements of the loan product.

Let us say that a customer required a £50,000 small business loan. After inputting the customer's data, the engine found that the customer did not qualify for a small business loan of this size, but was able to construct and offer a £30,000 small business loan and a £20,000 home equity loan. The customer is able to obtain what they need, while the bank serves the client while maintaining their credit guidelines. In this case,

the optimization engine is configured to cross over traditional lending boundaries and examine the products of several bank lending areas, not just small business or mortgage.

Some of these engines, like iLog, are designed to be software objects, run from within another application, while others are operated as separate decisioning applications, or as service bureaus. Some will purely render the loan decision, while others are designed to be an integration point for the banks' products and process workflow, and to manage the process. In this later case, if a borrower becomes ineligible for the originally selected product, the engine can re-decision the application in real-time using updated information, and reassess the optimal solution.

Finally, even the method of optimization differs, with some engines using a decision tree methodology while others use a rules-based or an iterative optimization process employing multiple simulations to determine

the optimal, not just an optimal, solution. Some engines employ a combination of logical and mathematical approaches, and will use several different methodologies where the requirements differ.

### THE FUTURE

It is clear that the modern era and the once widely available investment funds for Internet technology have spurred considerable evolution in technology solutions to meet practical needs. While the industry has been slow to adopt many of these, in many cases it is because the solutions are more advanced than the banks are actually able to make use of. In fact, many of these solutions have now been purchased for a fraction of their value by the traditional technology providers and will be integrated into, or with, core systems or other offerings. While this will reduce the opportunity for banks to buy these "best-of-breed" specialty applications, they will be more integrated and practical as a result of being embedded in other technologies.

Many of these technologies are already making their way to Latin America and Europe, and some native solutions are gaining ground as well. Chile-based BEE Software, for example, has developed a Latin America focused solution, BEE-Bank, that facilitates CRM, complex decisioning, rate indexation and even complex collateral tracking and valuation. Their solution is fairly sophisticated and tightly integrated with both the Internet and mobile commerce.

As these systems evolve and banks face increasing competition from foreign competitors operating within their geographies, market pressure will dictate that banks begin to provide greater service to customers without sacrificing the bank's profit objectives. Ultimately, the cost and risk of developing all systems internally will continue to increase the level of software licensing, and some of the top software vendors in the world are now poised to take their solutions global.