

Point-of-Sale Mortgage Technology

by Jack Guttentag and Allan Redstone

This paper is primarily directed toward point-of-sale mortgage technology. Since our firm specializes in this segment of the market, the reader is hereby warned that our views may be self-serving. We hope, however, that they also will be informative and provocative.

The paper is divided into three parts. Part I describes how point-of-sale technology relates to the various other major components of mortgage technology. Part II discusses the features of point-of-sale technology that will be strategically critical going into the next century. Part III considers some implications for the effective management of mortgage technology.

PART I—COMPONENTS OF MORTGAGE TECHNOLOGY

Mortgage technology is directed toward all the major functions that are performed between the time a lender prospects for a loan and the time the borrower makes the final payment to retire the balance. The relationships between the major technology modules are illustrated in Figure 1, "Components of Mortgage Technology." The modules are as follows:

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Point of Sale

Point-of-sale technology is used to facilitate the loan sale and begin the origination process. The amount of functionality embedded in point-of-sale systems varies widely, and simple ones do nothing but take and forward the loan application.

The more advanced system illustrated in the diagram can support the following functions at the point of sale:

- Managing leads and referrals from various outside sources.
- Scripting and other functions employed to support telemarketing operations.
- Providing the customer with accurate information regarding prices and qualification requirements.
- Counseling the customer with regard to comparative costs of different loan programs and the "best fit" to the customer's needs.
- Generating legally mandated disclosures, documents requesting information from third parties, documents bearing on the transaction requested by the customer and lists of documents that must be provided by the customer.
- Registering the transaction with the lender, including a possible "lock-in" of the prices.

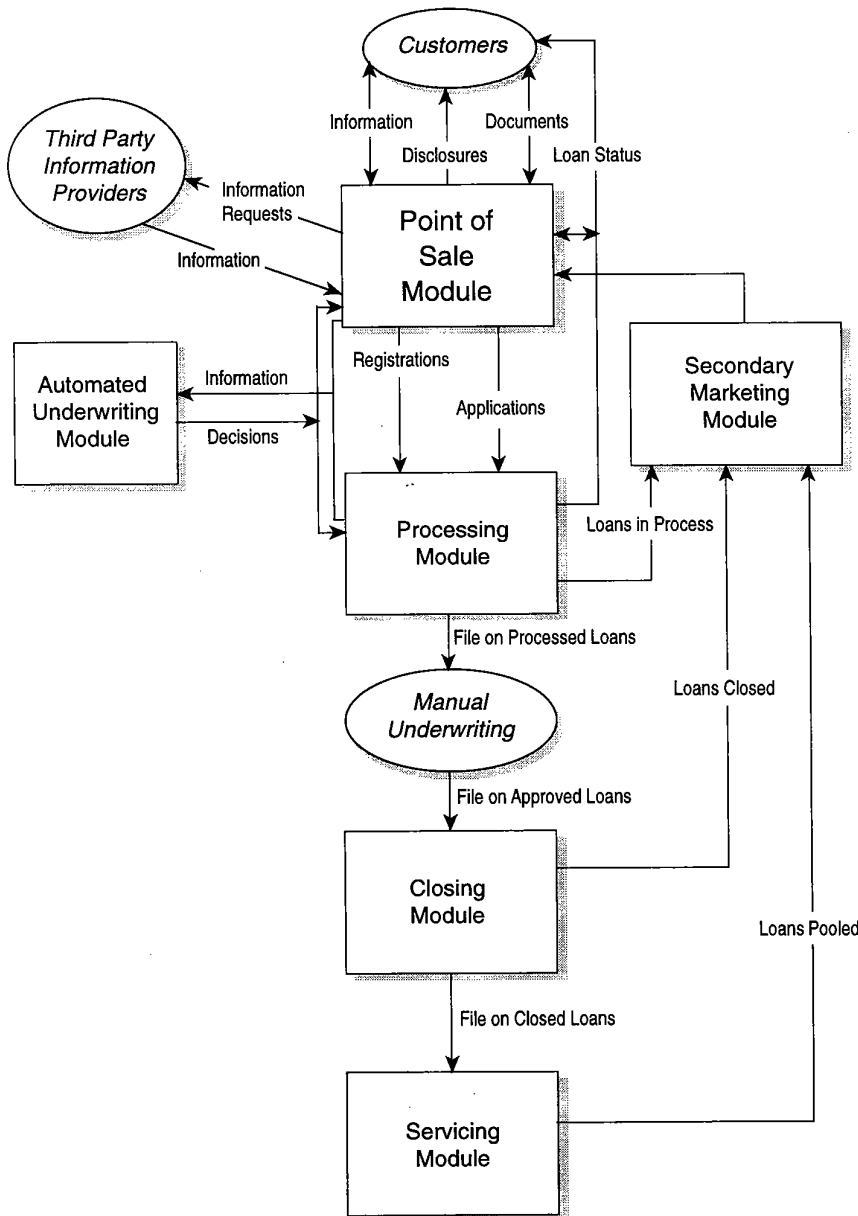
- Taking the application and sending it electronically to the lender's processing system.
- Pre-approving the customer for a loan or mortgage payment of some specified size prior to a home purchase.
- Approving the loan through an interface with an automated underwriting function.
- Receiving information on the status of loans in process electronically from the lender's processing system for delivery to the applicant.

This technology will be the major focus of the paper, but it is important to understand how it relates to other mortgage technology components.

Processing

Processing technology begins where point-of-sale technology leaves off, to generate additional required documents, track the progress of documents sent out and received, track changes in the application, deliver application status information to the point of sale, deliver information on loans in process to secondary marketing, deliver completed information files to underwriting for decision, and deliver files on approved applications to closing.

Figure 1. Components of Mortgage Technology



Closing

Closing technology begins where processing ends, to generate and print the documents needed to close the loan, such as notes, deeds, escrow instructions and the like, and deliver information on loans closed to secondary marketing.

Secondary Marketing

Secondary marketing technology converts information on loans in process into forms useful for managing pipeline risk, and for sorting loans in the pipeline or recently closed loans into categories useful for sale in the secondary market. These two major functions of secondary market technology are sometimes handled in separate modules. Secondary marketing technology also generates the pricing updates that are fed to the point-of-sale module.

Automated Underwriting

Automated underwriting technology brings to bear all the transaction, property and borrower characteristics (including the credit report) to make an automated decision as to whether a loan should be approved, denied or evaluated further. Automated underwriting may be applied as part of either point-of-sale or processing technology, but is much more powerful in terms of shortening the decision time if applied at the point of sale.

Servicing

Servicing technology begins where closing technology ends. Loans that are closed (or purchased) are transferred to a servicing system where they remain until paid off or defaulted. Servicing technology handles payment records, delinquencies, rate adjustments, amortization and payoffs, investor reporting, management of escrow and other cash accounts, and sometimes pool selection and administration for securitization.

These six major components of mortgage technology are not hard and fast, and the boundaries between them are constantly shifting. In particular, more and more functions that traditionally have fallen under processing have moved forward to point of sale.

How MARS Works

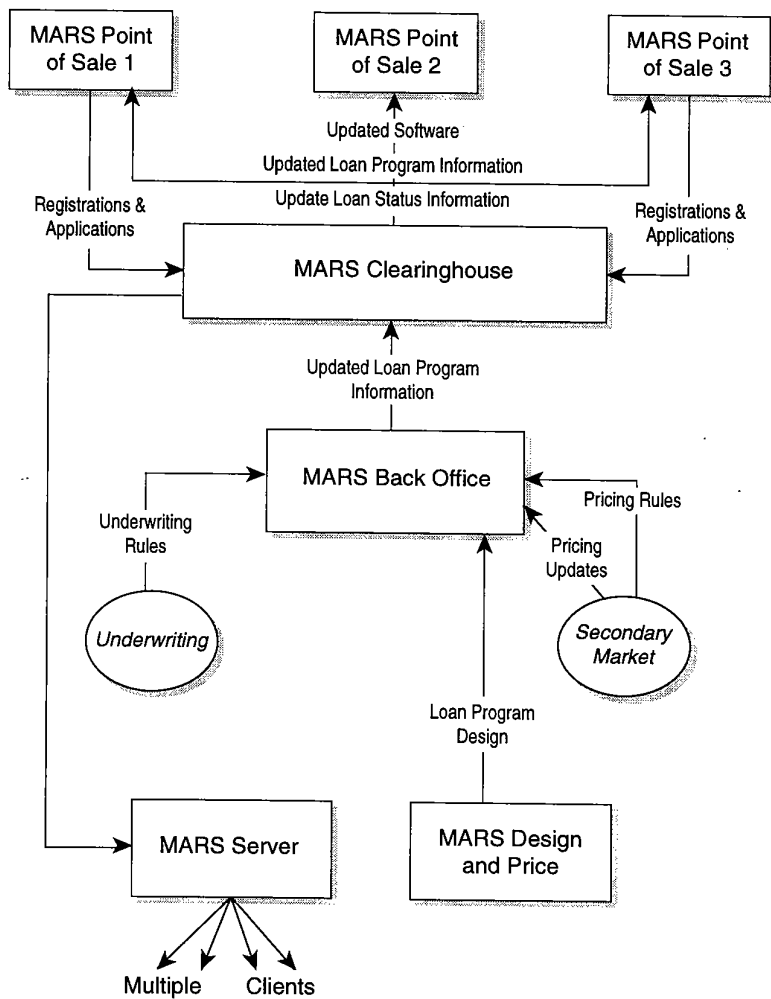
The major features of point-of-sale technology will be illustrated with the MARS System developed by GHR Systems, Inc., because it is currently the most advanced point-of-sale system available in the market. GHR started in business to design a point-of-sale system before there was a market for it, whereas other mortgage software companies focused on the other technology modules for which there was a market, and added point-of-sale features later.

Figure 2, "Components of MARS Upfront Technology," illustrates the use of MARS by an individual lender. MARS Back Office is where all the information covering loan programs is entered. This includes the major structural features of each loan program, including terms and options, which are defined in a mortgage design program shown at the bottom of Figure 2 called MARS DP (for "Design and Price"); underwriting rules, including mortgage insurance requirements, which typically originate in the underwriting department of the lender; and pricing rules which might originate in the secondary marketing department of the lender.

In a housing finance system with developed secondary markets, prices change frequently. Price changes posted by lenders that deal in the secondary market always originate in the lender's secondary marketing department, which continually monitors conditions in capital markets.

From MARS Back Office, updated loan program and pricing information is sent to the MARS Clearinghouse, a powerful computer

Figure 2. Components of MARS Upfront Technology



that acts as an information repository and distribution point to multiple points of sale (and to the MARS Server, see below). The Clearinghouse delivers to the point of sale current information on loan products and pricing,

status of applications in process, software updates and messages from the lender. Loan officers at the point of sale will usually call the Clearinghouse in the morning before seeing any customers to have the updated loan

program information (as well as information on the status of loans in process) downloaded to the loan officer's computer.

The Clearinghouse receives information on registrations, applications and pre-approvals (conditional approvals made at the point of sale), for submission to the lender's processing system. The database in the Clearinghouse can be mined for management reports of various types, including reports used in pipeline management.

PART II — CRITICAL FEATURES OF POINT-OF-SALE TECHNOLOGY

Program Design Flexibility

Mortgage technology designers often have a myopic tendency to hard-wire the mortgage instruments that currently dominate the market. This is risky because a change in the economic environment can dictate a change in the basic features of the instrument. Other countries have used price level adjusted mortgages ("PLAMS"), dual-rate mortgages, dual-index mortgages and other designs that have never gained a significant foothold in the United States but might some day.

MARS DP has the capacity to simulate how these and other loan types will perform over a variety of hypothetical future interest rate scenarios, and to make side-by-side comparisons of alternative designs.¹

Performance is measured from the standpoint of both the lender and the borrower. MARS Back Office can be readily modified to accept any designs that originate in MARS DP.

Multiple-Lender Applications

The ability to deliver the products of multiple lenders to a single point of sale where consumers have a choice will be a strategically critical feature of point-of-sale systems in the future. Consumers want it, the technology

permits it, and in the U.S. there are now a number of major players with a financial interest in providing it. Most of them are not mortgage lenders but other types of financial firms which are constantly seeking to expand the range of financial services they offer to their customers. They include investment banking firms, technology firms and real estate firms.

As one illustration, The Home Mortgage Network (THMN) is a wholly owned subsidiary of HFS Inc., which also owns three large real estate franchise firms: Coldwell Banker, Century 21 and ERA. THMN is currently using the MARS technology to offer the programs of about 30 lenders to several hundred Coldwell Banker offices, and the expectation is that the scope of the THMN program will be expanded both at Coldwell Banker and the other franchise firms. Other multiple lender applications using the internet are now in planning stages. (See section on "New Internet-Based Direct-to-Consumer Distribution Channels," below.)

Clearinghouse functionality is indispensable in multi-lender applications where different sets of lenders are used at different points of sale. Figure 3 illustrates how the MARS Clearinghouse combines the program/price information for multiple lender sets, and delivers each set to the appropriate office. In the case of THMN, for example, there are currently about 30 lenders on the network, but any one real estate office may receive programs from only eight or nine.

Client-Server Architecture

Importance in Mortgage System Design. Client-server architecture refers to systems designed to centralize databases and analytical functionalities in a powerful server, which communicates with multiple "client" computers that request information from the server. The server could be on the other side of the world, in the next room, or even in the same computer.

Client-server architecture is of critical importance in the design of mortgage systems for three reasons. First, it can assure consistency in the application of pricing and underwriting rules. The loan origination process involves a number of steps occurring over a period of time, which are embedded in the separate technology modules illustrated in Figure 1. During the process, it is common for one or more of the terms of the transaction to change. By embedding all loan program/pricing/qualification information in a server connected to each technology module acting as a client, as illustrated in the lower left of Figure 4, a lender can avoid having to replicate this information in each module separately.

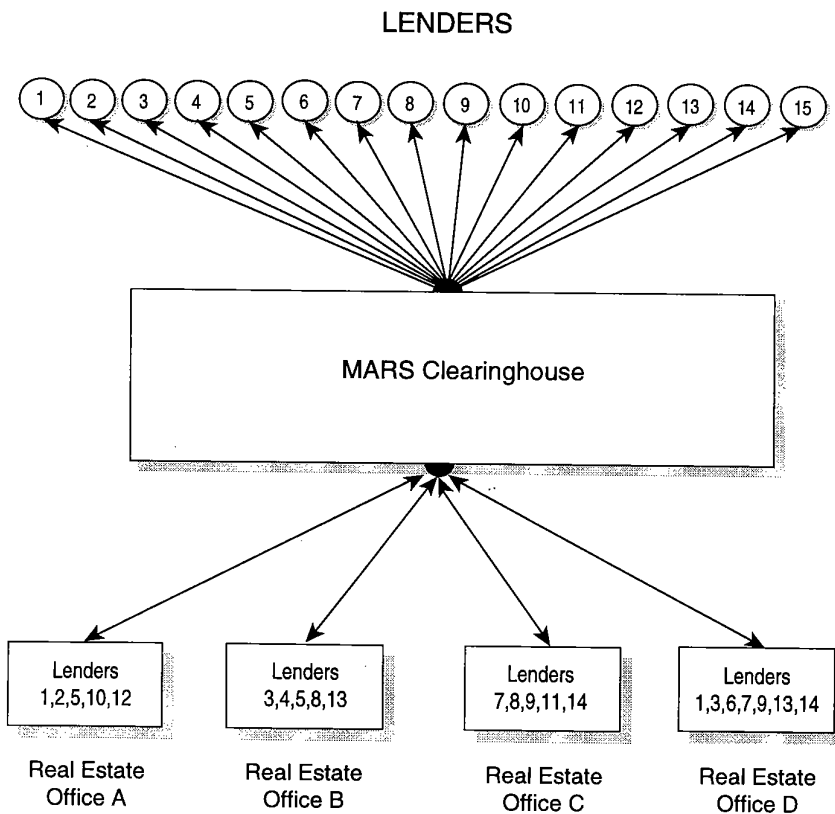
Suppose, for example, that after the application has been sent to processing, the borrower decides he wants to pay a higher rate in order to reduce the points. The processor can then ask the server to find the rate/point options available on the selected loan program as of the date the loan terms were locked. This assures consistency and quality control over the entire process.

The second reason that client-server architecture is important in mortgage systems design is that it allows multiple distribution channels to be serviced from a single server, which has been programmed to allow for whatever pricing/program modifications are associated with the different distribution channels. This is illustrated in the lower right of Figure 4.

This is particularly important in the U.S., where multiple distribution channels are already the norm and new channels continue to evolve. Without a system based on client-server architecture, lenders gravitate toward organizational as well as technological separation, with resulting system redundancies and pricing/program inconsistencies.

Finally, client-server architecture makes possible entirely new "direct-to-consumer" multi-lender distribution systems using the internet. These will be discussed later.

Figure 3. Components of MARS Upfront Technology: Multiple-Lender Application



Client-Server Architecture in MARS. The relationship between the MARS point-of-sale software and the MARS Clearinghouse illustrated in Figure 2 can be viewed as a client connected to a server, but we don't usually view it this way because the MARS Point-of-Sale software holds all the functionality and data it needs, except for price and program updates. The point-of-sale computer contains both the client and a copy of the server. The more common type of client is more heavily dependent on the server for both functionality and information, as illustrated at the bottom of Figure 4.

A MARS Server contains:

- One or more "Dynamic Linked Libraries" (DLLs), which are bundles of software functionalities and data that can be readily connected to a "Client Application." MARS has three DLLs that cover (1) Loan program and pricing information; (2) Borrower and qualification information (including closing costs) and analytics; and (3) Documents.
- An Application Program Interface (API) which provides access to the information

and functionalities in the DLLs to a Client Application.

A Client Application is the software that uses the information and analytics in the DLLs to "do something." An essential component of a Client Application is the user interface—what the user sees on the screen.

While it took over eight years for GHR to develop the DLLs, which have unique features (see next section), Client Applications are comparatively easy to program. This opens the way for customers of GHR to build their own applications to their own specifications without having to reproduce the powerful and complex functionalities that are contained in the DLLs. Each of the technological modules in the lower left of Figure 4, and each of the distribution channels at the lower right, have a different Client Application.

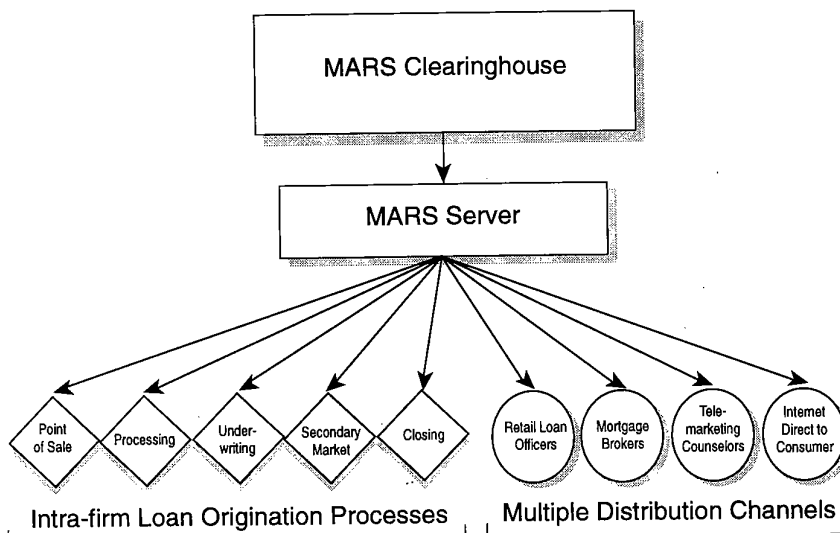
The Capacity to Accommodate Extensive Program/Price Nichification

The capacity to accommodate loan program/price nichification is perhaps the single most important feature of a point-of-sale system.

Defining Nichification. Nichification is "the modification of prices and underwriting requirements for an extraordinarily large number of combinations of transaction, borrower and property characteristics."² As a trivial example, the rate on a \$150,000 30-year fixed-rate mortgage is 8% with 3 points and 8.5% at 0 points, but:

- Add .25% to the rate if the loan is above \$250,000 or less than \$75,000.
- Add .5 to the points if the loan is secured by a two-family house.
- Add .25 to the points if the property is in Los Angeles.
- Deduct .25% from the rate if the ratio of loan-to-property-value is less than 70%.

Figure 4. Components of MARS Client-Server Architecture



- Add .50% to the rate if the loan is a refinancing and the borrower will take cash out of the transaction.
 - Add .5 to the points if the borrower does not escrow tax payments.
- Etc, etc.

Nichification is driven by the secondary market, which is constantly seeking to identify those characteristics that affect default risk, prepayment risk and servicing cost, and price them. The extent of nichification, as measured by the number of characteristics and combinations of characteristics that the secondary market uses in pricing, is constantly increasing.

A point-of-sale system accommodates nichification to the degree that it allows (a) entering the required pricing modifications at the level of the lender's "back office"; (b) delivering it

electronically to the point of sale; and (c) retrieving it there quickly and without error when a customer appears.

The Importance of Accommodating Nichification. The inability of a point-of-sale system to accommodate the prevailing level of nichification results in some combination of average pricing and manual retrieval. Manual retrieval results in errors and delays which substantially raise costs.

Average pricing means that the originator in its own pricing does not recognize all the pricing modifications it will face when it sells into the secondary market, hoping that the pluses and minuses will balance out. If other originators do price the modifications, however, the ones who don't will face adverse selection. Increasingly they will find themselves acquiring the loans with less desirable characteristics as the better loans go to the originators who favor those loans in their pricing.

Portfolio lenders are not under the same degree of pressure to recognize nichification in their pricing as lenders who sell in the secondary market, but if they operate in a mixed portfolio/secondary market system such as that in the U.S., the portfolio lenders will face the same kind of adverse selection. Even in a system without secondary markets, portfolio lenders who nichify in their pricing will impose adverse selection on those who don't.

For the lender with a point-of-sale system that does not accommodate nichification, the alternative to average pricing is manual retrieval at the point of sale. Information on pricing modifications must be delivered to the loan officer or mortgage broker at the point of sale in product manuals, fax price sheets or by telephone. Manual retrieval is time-consuming and invariably results in frequent and costly mistakes.

Note that direct-to-consumer networks employing the internet can't use manual retrieval. If the point-of-sale system underlying the network does not accommodate nichification, the only option is average pricing. This means that any such network will not be viable in the long term if it must compete with other networks that do accommodate nichification.

Nichification and MARS. MARS is unique in the capacity to accommodate loan program nichification fully. MARS allows lenders, for any one loan program, to enter up to 40 million prices corresponding to that many combinations of transaction, borrower and property characteristics. Across multiple programs, the number of possible combinations is infinite, i.e., a 30-year FRM could have 40 million and a 15-year FRM could have a completely different 40 million. To date, the largest number that has appeared on any one program is about 18 million, and the numbers are rising. The way in which MARS is constructed, however, allows for expansion in both the list of characteristics and in the number of combinations allowed, when that becomes necessary.

Loan Approval Decision Time

To the consumer, one of the critically important features of a home loan transaction is how long it takes for the lender to make a decision. The clock begins ticking for the consumer when the application is completed, and in some cases even earlier when the terms are "locked" through a registration with the lender. These functions use point-of-sale technology, which is critically important in determining how long the entire process takes. Of course, it is not the only determinant.

Three features of a point-of-sale system impact importantly on how long the process takes: document generation, information checking and accommodation of automated underwriting. All will be discussed in connection with MARS.

Document Generation. Home loans generate an enormous number of documents, either as hard copy or electronic files. Some hard copy documents must be provided as a disclosure by the lender to the borrower. In the U.S., there are a number of such disclosures mandated by the federal government in every transaction, such as the "Truth in Lending Disclosure" which reports the annual percentage rate (interest cost) of the loan. Many other disclosures are mandated by the 50 states for transactions within their jurisdictions.

A second category of documents are requests for information made to third parties, which may be hard copy or electronic. An example would be a request for an employer to verify the applicant's employment, or a request to a credit reporting agency for a credit report.

A third category of documents are requests by the borrower for information bearing on the transaction, such as a rate/term/program comparison report or an amortization schedule.

A fourth category are documents provided by the lender as an information service to the

customer, such as information about a particular loan program and how it works.

In addition, lenders require borrowers to provide documents that depend on the specifics of the transaction and might vary from lender to lender. For example, if the borrower claims alimony payments from a divorced spouse as part of his income, lender A might require that the applicant provide a copy of the court order, although lender B might accept copies of canceled checks for two years.

The MARS Point-of-Sale System generates all of these documents, or requests for documents, plus a list of documents required of the borrower, on the spot—immediately after completing the application, and in some cases before. This can substantially shorten the decision period. In many other systems, documents are not generated until the application reaches the processing stage, and in some cases not until it reaches underwriting.

For example, using MARS, the applicant claiming alimony income would receive a list of documents required of him, which would include the court order if it was lender A, or two years of canceled checks if it was lender B, as soon as the application was completed. Otherwise, these documents probably would not be requested until the processed application was turned over to an underwriter.

Information Checking. Home loans go through a series of steps at any one of which the terms of the deal may change. For example, the borrower may want to select another rate/point option, or based on information received from the employer, the borrower's income might have to be reduced from that previously reported, which requires that the qualification process be done over. Occurrences of these types, which are more the rule than the exception, usually slow down the process because the employees involved in the different functions don't have direct access to the same information.

If a MARS Server is available throughout the entire organization, however, changes in the terms of a deal, or the need to requalify the applicant, will not cause delay. Every employee will have access to the program/price data set needed to select a new price option, and to the analytical functionality required to requalify the borrower.

Automated Underwriting (AU). AU is a process of electronically rating the riskiness of a loan using information from the credit report plus other characteristics of the transaction, such as the type and location of the property, purpose of the loan, ratio of housing expense to borrower's income, ratio of loan-to-value, etc. Automated underwriting systems have been sponsored by the two quasi-governmental conduits, Fannie Mae and Freddie Mac, and by the major private mortgage insurance companies (PMIs).

After an applicant is qualified for a particular loan, an extract of information from the transaction together with information from a credit report and perhaps from an appraisal check is sent to the AU's "black box," which might be in the computer of either the user or the AU sponsor. A proprietary algorithm residing in the box generates the output, which is a statement of acceptability of purchase in the case of the agencies, and a score representing probability of loss in the case of the PMIs.

GHR and many other mortgage software firms have developed interfaces with these AU systems. In many cases, the AU systems interface with processing rather than point-of-sale systems, which limits the extent to which decision time can be reduced.

The current generation of AU systems are not integrated into pricing/qualification systems. Hence, if the AU sends back an unsatisfactory answer, the loan must be recast and the process repeated, perhaps many times. Further, prices are set independently of the results of the AU process, which means that lenders are

forced into a prior determination of the risk for which they are pricing, and must reject loans that don't meet that standard.

The next generation of AU systems will be integrated into the pricing/qualification systems in such a way that the loan options for a given customer appearing on the screen are (a) correctly priced for risk and (b) approved at the terms shown. Then the decision would be made automatically at the point of sale, except for deals that the AU system says should be reexamined by a human underwriter.

New Internet-Based Direct-to-Consumer Distribution Channels

With the emergence of the internet as an information distribution channel, the client-server architecture of MARS makes possible new direct-to-consumer distribution channels. These new channels will fundamentally change the economics of providing information to consumers. Under existing distribution channels, lenders are not incented to educate consumers, because it adds to costs and reduces the lender's bargaining power. Under the new distribution channels, information and education will be used as a competitive tool by sponsors of networks who will offer their customers the products of multiple lenders and the information to make wise choices. These network sponsors will come from outside the mortgage industry and will have a recognized identity and a large customer or membership base.

Eventually the new networks will dominate the system. The reasons are evident from a comparison of how the existing system and the new system will look to consumers.

The Existing System. If borrowers deal with a known lender, they aren't sure they are being offered a complete line of products or competitive prices.

If they deal with a mortgage broker offering the products of several lenders, the broker

typically will not be known to them and they fear overcharges ("overages").

In either case, they fear that commission-incented loan officers will steer them to products on which the commission is highest. They get little if any help on tough decisions such as selecting between an FRM and an ARM, deciding how much to put down, whether to buy protection against a change in rates, etc.

No information is available to them on lender performance except from real estate sales agents, whose referrals are suspect.

Shopping lenders is extremely time-consuming, and by the time they are finished, changes in the market can invalidate the results.

Making "apples-to-apples" price comparisons is extremely difficult in any case because there are so many price variables: rates, points, "junk fees" and mortgage insurance premiums.

Government-mandated disclosures ("Truth in Lending" and "Good Faith Estimate of Disclosure") are misleading and confusing.

New Delivery Systems. Consumers will be offered a reputable service-provider, products from multiple lenders and a commitment of equal treatment.

Consumers will be supported by salaried, lender-neutral loan counselors, trained to counsel them on the toughest questions.

The network sponsor will track and report to consumers on the performance of the lenders on the network.

Shopping multiple sources will be quick and easy, with consumers able to track the market for a period before making a commitment.

Making side-by-side comparisons of different products will be easy, using a single "All-in-RateTM" that captures all the costs of credit

to the borrower over the borrower's time horizon.

Documents provided to the borrower will use "plain English."

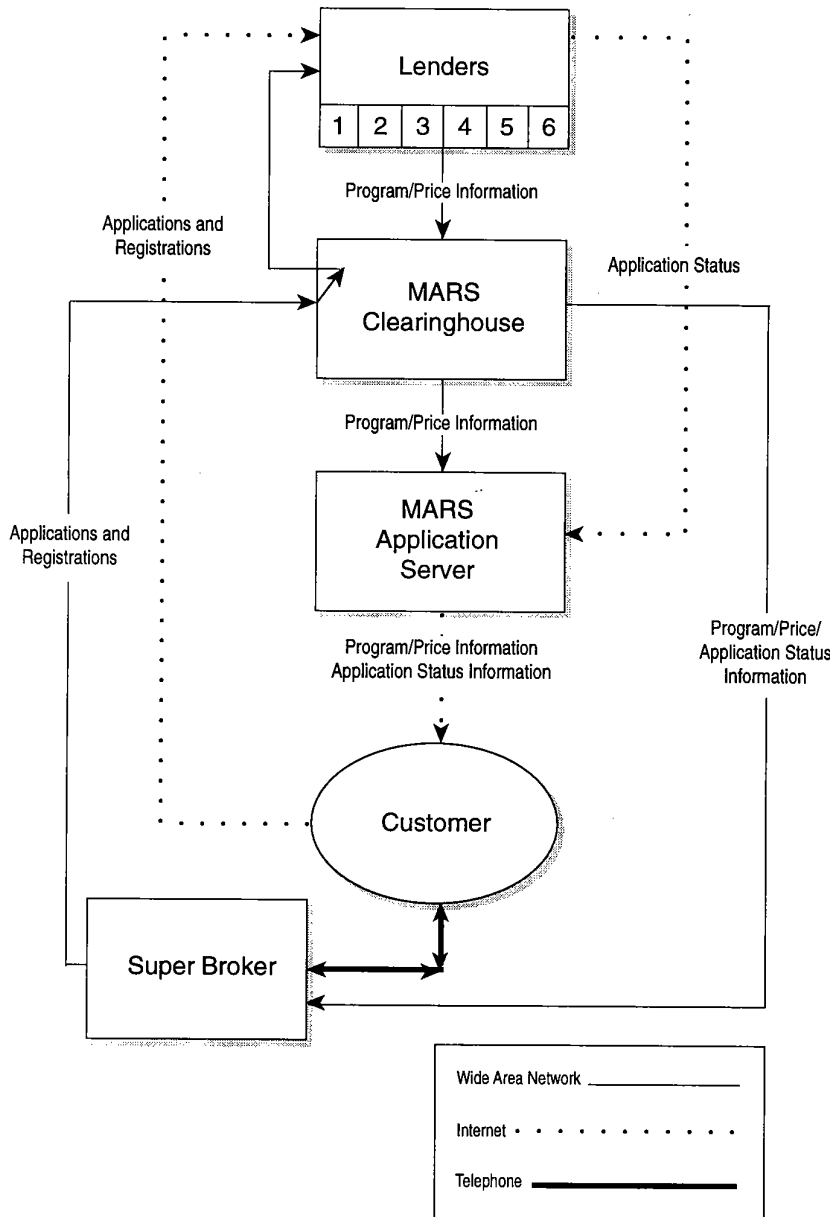
How the Systems Will Work. The way the new systems will work is illustrated in Figure 5. Program/price information provided by lenders is entered in the MARS Clearinghouse from where it goes to the MARS Application Server. This is the MARS Server as defined earlier; but in addition to the MARS DLLs and API, it includes the Client Application of the network sponsor. The most important part of the Client Application is the user screen. Customers access the MARS Application Server on the internet and may proceed in several ways, two of which are illustrated.

The fully reliant consumer can do it all on-line: make a selection of loan and lender, register the loan with the lender chosen, fill out the application and receive status information back from the lender. The information flows are shown by the dashed line on Figure 5.

The prices shown the consumer on the user screen are the wholesale prices posted by the lenders plus the network sponsor's markup. Since most states in the U.S. require that any entity that is paid by a lender be licensed as a mortgage broker, the network sponsor has to be licensed to operate in this way.

Because many consumers will want to take advantage of this distribution channel but will not feel sufficiently competent technologically to do it on their own, a cottage industry of counselors will quickly develop to help them. The consumer will hire the counselor in a straight fee-for-service deal that has none of the conflict of interest involved in deals with mortgage brokers. (The income of mortgage brokers consists of the markup they add to the wholesale prices offered by lenders, which means that they have a financial interest in inducing the customer to pay as much as possible.)

Figure 5. A MARS-Based Internet Distribution System



An alternative for consumers who don't want to complete the process themselves is to call a mortgage "super broker" who will provide advice and counsel, and take the borrower's application over the telephone, delivering it to the lender selected. (The initiative might also come from network sponsors who prefer to operate in this way). This is illustrated in Figure 5 by the heavy black line running between the customer and the super broker, and the solid lines connecting the super broker and the lender. The super broker communicates with the lender on the borrower's behalf through the MARS Clearinghouse over GHR's wide area network, rather than through the internet.

While the super broker is a mortgage broker both legally and functionally, it will implement the policies of the network sponsor who calls the shots. One policy that all network sponsors will implement will be uniform markups on the prices posted by the lenders on the network.

Still another approach (not illustrated in Figure 5) is to have the customer select the lender on the internet and then contact that lender directly on the telephone. The application would be taken by the lender's telemarketing counselor. In this approach, the network sponsor could be paid by the lender for a "lead," which again would require licensing. Alternatively, the borrower might pay for the facility, which would not require licensing.

Players in the New Delivery Systems. The most important players in the new delivery systems will be the network sponsors because they provide access to potential customers. The following are some likely characteristics of a network sponsor:

- It will have a recognizable national identity or will rapidly develop one.
- It will attempt to piggyback its home loan delivery system onto its distribution network for other financial services and vice versa.

- It will merchandise the quality of its lenders rather than pretending that it is the lender.
- It will merchandise its own neutrality in the selection of loans and lenders.
- It will merchandise the quality of the information it offers customers.
- It will merchandise its policy of charging all comers the same price for its own services.

Network sponsors will come from almost anywhere, but are mostly likely to be name technology companies with existing networks and investment banking/mutual fund families. We can be reasonably certain that they will not be major mortgage lenders, for the same reasons that stagecoach manufacturers were not among those developing the automobile.

The least important players will be the lenders because there are so many of them who will want access to the customers controlled by the network sponsors.

Super brokers will be a subset of lenders who are licensed to do business in 50 states and have effective telemarketing systems, who will compete for the right to provide this function under contract to the network sponsors.

GHR will provide the systems, which have already been described. Any lender whose products have been entered into MARS for the purpose of participating in a particular network can participate in any other MARS-based network by a flip of a switch, subject to the mutual concurrence of the lender and the network sponsor.

A number of different user screens probably will appear in the market, but there is a good likelihood that the number that survive will be

small. (Any user screen can be integrated into the MARS Server). Technology companies sponsoring networks will develop their own user screens, which they will probably private label to other network sponsors. A rapid convergence to a few user screens would enormously facilitate the emergence of an effective loan counseling industry.

**PART III — CONCLUDING COMMENT:
SHOULD MORTGAGE TECHNOLOGISTS
SELECT THE BEST OF BREED OR
THE BEST IN SHOW?**

This paper has highlighted the growing importance of point-of-sale technology. Among other things:

- Lenders cannot adjust prices and underwriting requirements for all the determinants of risk and cost recognized by the secondary market unless their point of sale system permits it.
- Network sponsors cannot deliver the products of multiple lenders to a single point of sale unless their point-of-sale system permits it.
- The ability of lenders to shorten the loan approval period depends importantly on the document-generation features of the point-of-sale system, whether the point-of-sale system provides an information checking service immediately available to the other technology modules, and whether automated underwriting is integrated into the point of sale system.
- With direct-to-consumer marketing on the internet, the quality of the user screen (a new component of point-of-sale technology) will critically impact the prospects for marketing success.

The information technology officers at mortgage lending institutions have long had to choose between selecting the best of the "complete" systems, or the best single component of each type which then had to be tied together at considerable cost and pain. Hence the question, "Best of breed or best in show?"

This decision has now become a no-brainer in favor of best of breed. This reflects the growing importance of point-of-sale technology, and the sharp disparity in the quality of different point-of-sale systems. To choose a complete system that does not have the point-of-sale features that are critically important would be a serious mistake.

The point is strengthened by the declining cost of integrating technology components from different vendors, reflecting the growing convergence on EDI standards for developing interfaces. Further, for some important purposes a point-of-sale system based on client-server architecture can itself integrate different technology components as effectively or more effectively than a single integrated system.

NOTES

¹ MARS DP was extracted so that it could be used in the Wharton School's International Housing Finance Training Program, where it is offered free to participants, courtesy of GHR.

² Jack Guttentag, "A Marketplace of Choices," *Mortgage Banking*, December 1996, p. 44.

³ The "All-in-Rate™" is the same as the Annual Percentage Rate (APR) that must be reported by lenders under Truth-in-Lending regulations in the U.S., except that APR is calculated over the term of the loan rather than over the individual borrower's time horizon.