

# *Why Should I Care About* **Rules Engines?**

BY TIM VANTASSEL AND BILL LEHMAN

**Rules-engine technology has come into vogue in the mortgage industry. We consider four basic applications: automated underwriting, product and pricing eligibility, workflow/business-process management and general-purpose rules engines.**

**W**HAT DO THE FOLLOWING HAVE IN COMMON: The conforming loan limit is \$417,000; fees cannot be greater than 5 percent of the loan amount; we do not originate loans with credit scores below 500; and all Texas loans need to route to Wanda for closing? Answer: They are all business rules. ● Rules engines, decision engines and workflow engines are all current buzzwords in our industry as we increasingly strive to automate the business rules that once were the domain of the specialist. This article will help the non-technical executive better understand these terms by defining what rules engines are, giving a brief history of their use in the mortgage industry and providing a framework for understanding the different options available. Ultimately it should allow the reader to better judge if the advantages of a rules

engine outweigh the cost of integration for their organization.

The mortgage industry is built on rules—eligibility rules, compliance rules, credit rules, workflow rules and more. Business rules are the tenets, terms and conditions that govern how we do our work. There are lots of them, and you can find them everywhere.

A trend in our industry is that the rules are changing faster and faster. This makes it more difficult for people (and our technology) to keep up with them. Most lenders' business rules are scattered throughout their systems, driving up maintenance costs. The rules are often poorly documented, hard to find and troublesome to change. A lender's inability to change its rules quickly and accurately constrains its ability to comply and compete.

Today, for example, most loan origination systems (LOSes) have business rules embedded in them to produce loan-specific fees and to check if those fees are in overall compliance. Both use similar business rules. However, the logic for applying the rules is typically found in the LOS in two different places and usually requires two different types of expertise to maintain, often by a programmer. If an LOS supports compliance, it is typically coded a third way. Pricing rules are typically coded in yet a fourth way.

These inherent differences make it increasingly difficult to maintain the rules effectively and efficiently. Rules engines have been growing in popularity as a means of better managing rules.

A rules engine is a specialized piece of software that is designed specifically to manage and process business logic efficiently. Rules engines make systematizing rules easier by allowing business logic to be cataloged and configured rather than embedded into code. Rules engines allow business rules to be implemented in a cheaper fashion because they are easier to understand and maintain.

Rules engines allow the user to readily see all of the rules that are in place within the system. In contrast, with legacy technology most rules engines have been built specifically to perform well when evaluating large numbers of rules—so their performance is often better.

An effective rules engine allows systems to meet the business demands in dynamic business cycles. Bill Brasington, a rules design architect at GMAC Mortgage Corporation, Horsham, Pennsylvania, describes a typical challenge as: "It's not unusual to get a call telling me I need to add three fees to six products in three states in 20 minutes to accommodate changing business needs."

Rules engines enable this type of response. They also allow a rule, once built and successfully tested, to be reusable. For instance, once the rule that determines if a loan falls within the conforming loan limit has been created, the rule can in turn be applied wherever necessary and updated in only one place.

In this rule-heavy industry, business-rules engines can provide an advantage over legacy systems by enabling quicker

impact analysis and shorter time to implementation. Some companies have even focused on their ability to rapidly deploy rules to create a competitive advantage, by allowing them to create mortgage products that they know their competitors cannot easily duplicate.

### A brief history

Rules engines are not new to the mortgage industry. One of the earliest examples of their use is in automated underwriting (AU). There were early attempts to automate the underwriting process in the 1980s, but they suffered from the lack of available data, a lack of understanding as to what data are predictive, limitations to the technology itself and lack of integrated policies and procedures.

Many of these issues had been solved by the early 1990s, setting the stage for the introduction of Calabasas, California-based Countrywide Home Loans Inc.'s CLUES™; Walnut Creek, California-based The PMI Group Inc.'s pmiAURA™; and, of course, Freddie Mac's Loan Prospector® and Fannie Mae's Desktop Underwriter®.

At the heart of each of these systems was a rules engine. These engines allowed lenders to meet critical business challenges. Countrywide needed CLUES in order to scale its organization while maintaining consistency. Norwest Corporation, now part of San Francisco-based Wells Fargo & Co., used its AU for consistency as well as being able to quickly decision borrowers while they were on the phone.

As lenders grew through acquisition, even medium-sized lenders needed consistency and control for pricing and locking. For example, typical of the last cycle, one lender had grown through acquisition and now ran five different retail origination systems. Each was a legacy system, and there was little advantage operationally to converting to a single LOS. However, the secondary marketing

department was having an extremely difficult time getting pricing correct in each system, because not only did each system have the products implemented differently, but each system had different capabilities.

The existing locking processes were largely manual. The information technology (IT) department and secondary marketing worked together and determined that their best path was a single product, pricing and eligibility engine with a Web site that loan officers would use to register and lock the loans. The reduction in pricing errors and control over the pipeline outweighed a multi-year integration plan.

The mid-1990s saw many mortgage servicers adopt predictive dialers as their first foray into rules-based systems. There was also the introduction of lien-release systems, with user-maintained rules for county-by-county requirements.

The late 1990s and early 2000s saw many lenders use imaging

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## 10 Hard Questions to Ask a Potential Rules Vendor

**W**ith many tools and approaches to choose from when contemplating an initial foray into rules engines, picking the one best-suited to your needs over the long haul can be a daunting task. The following questions are offered as a starting point for interviewing potential vendors.

### **1. What are the documented best practices for rules within your system?**

Decisions are going to be made about the structure of the rules that will be implemented. Clear direction as to where rules might change in the future will save expense down the road. The vendor should have a best-practices manual that shows you how to implement the rules and still be flexible. (Often your technical resources will have to make upfront decisions about the structure of the rules that your business intends to use. This can lead to that additional eligibility parameter costing as much as your current implementation if bad decisions are made.)

### **2. Can I talk to your existing clients about the level of difficulty of their integration into their legacy system?**

Be sure to spend a lot of time in your due-diligence phase on understanding the level of effort required to integrate a rules engine into a legacy environment. If possible, talk to another lender on the same legacy system.

### **3. How do I pull rules out of the system to review them with the business users.**

If the rules you are using cannot be reviewed with an English description, you will be paying for the ongoing translation of “What I have in the system” into “What do I have in business terms?” This is a waste of money, particularly in that the translation will always be somewhat inaccurate. Require this of your vendor.

### **4. Is there a proven, automated way to test the rules?**

A good rules engine should have a proven, automated way to test the rules in the system; ideally, it would come with a testing framework. This is critical to making changes in a low-cost manner after you have rolled out the system during regression testing.

### **5. Can I easily move rules into production from where I test them?**

Moving rules from environment to environment without re-

entering them should be both possible and dependable. You should ask what sort of migration tool is provided, if any, and make sure your development staff knows about this. If a vendor recommends that you use your production environment for testing to keep things simple, it isn't in your best interest.

### **6. How do I know when a rule was turned “on” in the system?**

Dependent on your business application in regard to the Sarbanes-Oxley Act, you might be required to know what rule fired at what time on a given loan. If this is the case, the question should be asked and designed upfront. It will be next to impossible to build this in easily as a result of a compliance audit.

### **7. Will the system return the results of a rule failing as a usable text message?**

This can be very expensive if the user has to be provided documentation as to what a failure message means. The goal should be to create an implementation where the users become experts on the tool simply by using it. You don't want a situation where new users frequently are required to ask others in the office, call the help desk or use help documentation.

### **8. Will only the first rule that failed show, or do all the rules that failed have to show to the user?**

This sort of question typically comes up sometime in the user-acceptance test, and should be answered upfront because you may not be able to choose which way you would like the implementation to work. Ask this at the start; typically it is one way or the other.

### **9. What level of skill is needed to support and maintain my rules engine?**

Your rules implementation may go very well with the help of deeply skilled vendor resources, but you may realize that the skills needed to efficiently maintain your technical implementation well exceed those of your current staff.

### **10. Is there a graphical way to see what will be affected by a change to a rule?**

This is the heart of the matter when it comes to maintenance and change. Elaborate rule-structure logic can be complicated to change. At the outset you should be thinking about how you will be able to make changes to your rule set. Maintenance cost should be considered and projected upfront in the process so that design will include it as a concern.

to increase the productivity of their post-closing department. National City Mortgage Co., Miamisburg, Ohio, for example, implemented a workflow engine ovetop of an imaging system as part of its Image Express post-closing initiative. This project totally reengineered its post-closing business, combining imaging and workflow to double the throughput of its post-closing department.

### **A framework to understand different types of rules engines**

There are many rules engines to choose from in today's market. Some are built for a specific purpose, while others are designed as general-purpose rules engines. Examples of specific-purpose engines are automated underwriting systems (AUSes), compliance engines, default-management predictors, predictive dialers,

pooling-optimization systems, workflow/BPM (business process management) engines and product and pricing eligibility (PPE) engines.

These can be good if an organization has a specific problem to solve. However, as more problems are solved, the use of the engines can also proliferate. Therefore, larger organizations sometimes lean toward using a general-purpose rules engine, preferring to use a single product to build all of their solutions. Some lenders even choose to build specific-purpose rules engines themselves (usually structured query language [SQL]-based processors).

This article concentrates on four different types of rules engines commonly used in the mortgage industry: PPE, AU, workflow/BPM and general-purpose. While many products are trying to blur the lines among these categories, this division is useful for understanding why choosing one product over another can make for a more successful implementation. The choice of business-rules vendor should vary based on the task at hand and those contemplated for the near term.

### **Product and pricing**

The most common category of rules vendors are PPE-focused providers. Historically these arose because the product and pricing functionality typically embedded in most loan origination systems was not extensible to the Web. In order to push pricing out to consumers or brokers/correspondents, lenders needed other solutions.

PPE-focused rules engines allow you to set rules for product eligibility and price based on a configurable set of loan parameters. Implementations of this functionality vary widely in complexity, with the simplest eligibility implementation showing whether a borrower is eligible for a specifically selected product. More common is an implementation where all eligible products for the borrower are shown, with explanations provided for ineligible products.

"Best fit" is the most complex type of PPE implementation. Best fit is determined by showing the eligible products that the borrower would be best served by based on the borrower's stated needs.

PPE functionality is commonly available in most major LOSes or through providers of business-to-business (B2B) portals, such as Avista Solutions Inc., Columbia, South Carolina; Beanstalk Network/OpenClose MTG, West Palm Beach, Florida; Dorado Corporation, San Mateo, California; and experITy, Columbia, South Carolina.

### **Automated underwriting**

The second category of vendors is AU vendors (which usually also provide PPE functionality). To be an AU, a system must provide a credit decision/risk grade and loan-specific conditions. This typically requires the capability to read a credit report.

Most subprime lenders look for a vendor that is both an AU

and PPE provider, since the decision and price are intertwined in their business model. These products can natively read credit reports and readily apply rules based on borrower credit and capacity, as well as accomplish PPE tasks like maintaining product guidelines and rate sheets.

Examples of vendors in this category are ARC Systems, Austin, Texas; Commerce Velocity Inc., Irvine, California; GHR Systems Inc., Wayne, Pennsylvania; Overture Technologies, Bethesda, Maryland; and Portellus Inc., Irvine, California. An AUS is usually the most complex implementation of a rules engine that mortgage lenders undertake, not because of the technology or the nuances in the requirements, but because of the change management to the process and the organization required to be successful.

### **Workflow or business process management**

The third type of rules engine found in the mortgage industry is workflow automation or business process management. Workflow automation of business processes varies in complexity, from simple screen sequencing all the way to clear association of work responsibility in priority order presented to the right person. This final category is expensive to build because it requires a level of process standardization that many lenders do not have currently, but this is where big productivity improvements are possible.

Although great things are possible with workflow automation, it is the large organizations that often benefit most by leveling workloads to aid in busy times and where operations are not necessarily tied to the hard copy of the loan file. It can be a difficult task to achieve return on investment (ROI) for smaller lenders.

While still relatively new in the mortgage industry, workflow automation and business process management have seen explosive growth in recent years in other industries.

There are more than 150 vendors in this category, but some common names in the mortgage industry are FileNet Corporation, Costa Mesa, California; Lombardi Software Inc., Austin, Texas; Fuego, Plano, Texas; and Pegasystems Inc., Cambridge, Massachusetts. It should be noted that the typical LOS is not designed to be readily controlled by an external workflow engine, thus contributing to slow adoption of this technology. The issue with stand-alone workflow/BPM engines, however, is not only the cost and difficulty of integration, but also the cost of maintaining the rules. The rules controlling the flow of activities surrounding loan origination are often among the most complex aspects of the business.

### **All-purpose rules engines**

The last type of these products is the all-purpose rules engine. Independent of any particular industry focus, these engines are typically used as an enterprise standard deployed

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across various business channels and functions. These engines are very flexible in the storage, building and application of business knowledge, policies and practices once tailored to the task specifically at hand.

All-purpose rules engines can be used to create an AU or a PPE, or for any other application of rules. Compliance vendors, workflow and business process management engines are commonly built with these tools providing the underlying plumbing.

Examples in the mortgage industry include San Rafael, California-based Fair Isaac Corporation's Blaze Advisor™; Mountain View, California-based ILOG Inc.'s JRules™; and Greenbrae, California-based MDA MindBox Inc.'s ARTEnterprise™. Products in this category have no built-in credit report understanding, no built-in PPE module and no preconfigured way to maintain product guidelines, but there is typically a way to build a customized solution that will do everything exactly as the lender desires.

All-purpose rules engines are typically seen at larger lenders that have a great deal of complexity around product, geography, channels and/or corporate structure.

Several of the providers in the all-purpose category have recognized the need to provide more "out of the box" mortgage-specific functionality, and are rapidly building mortgage-specific components that will attempt to position them in the space held by AU and PPE providers. However, it must be noted that the AU and PPE providers, in turn, are getting very good at providing the rules flexibility that is needed for the majority of implementations.

#### Case studies

Some companies have made their ability to effectively deploy business rules a core competency to create a competitive advantage. One Wall Street firm started a new subsidiary specifically to be able to originate new types of new products quickly. Even though the firm owned an LOS that has a PPE, the types of loans it designed were so innovative that 50 percent of its products could not be modeled and exposed to the Internet. Therefore, the firm chose a combined B2B front end with an AU/PPE to front-end its LOS. It is able to be first to market with new products. In a market like this, that product differentiation has allowed the company to grow dramatically.

In another example, Saxon Mortgage Inc., Glen Allen, Virginia, implemented a new AU engine to replace a solution from a vendor that was not progressing and required programming to change the rules. Saxon was interested in a very powerful engine that could perform all the AU and PPE functions needed to support their product mix and make counteroffers when needed.

As Saxon had already determined its integration points with previous technology, the company chose an AU vendor and built a custom engine, named i-Deals™, to meet its requirements "It is

as if the borrower is sitting down with an experienced loan officer, since i-Deals will structure the best approvable deal," says James V. Smith, president of Saxon Mortgage. "In addition, our credit guidelines are now maintained by our Pricing Group, instead of IT, which provides us with a quickness with which we can change our pricing, update for new products or update product changes. i-Deals also provides our sales force with more functionality with structuring a loan deal, providing counteroffers, and it is available 24/7."

National City Home Equity, a division of National Bank, Cleveland, needed to upgrade its home-equity line of credit (HELOC) wholesale pricing to allow it to be exposed to the Internet, as well as be more flexible and user-maintained. National City chose an AU vendor with a strong deal-structuring capability, and a service-based architecture to integrate with its legacy system and existing Web sites. The result is a low-cost, highly responsive, highly flexible, in-house capability to use, manage and publish National City HELOC prices.

#### Why doesn't everyone use rules engines?

Although rules engines can be very powerful, it can be difficult in some cases to integrate them into legacy technology. In some organizations the cost to integrate would outweigh the benefits. This has been especially true with workflow engines, where the maintenance of the rules (even with a rules engine) can be very costly, and that cost needs to be spread over a lot of closed loans to make it worthwhile.

Some lenders on legacy systems, however, have been able to introduce a rules engine into their environment for decisioning. Non-prime lenders have typically adopted rules engines faster than prime lenders because of their need for specialized automated underwriting. Now wholesalers are pushing fast because of their need for integrated B2B pricing and locking solutions.

Rules-engine technology is a cheaper, faster and more maintainable way to implement the large amount of business

logic that underlies the mortgage industry. A wide variety of products exist, with some providing out-of-the-box business-rule functions targeted to specific uses such as automated underwriting and product, pricing and eligibility.

Depending on the task at hand, choosing one vendor over another will greatly affect the time to market, cost to implement and cost to maintain a given rules-engine implementation. (See sidebar for an outline of the most important questions to ask vendors during the interview and selection process.)

Making rules easy is the underlying goal of every rules engine. Lenders that keep this goal in mind are achieving a good return on investment in a wide variety of applications. **MBT**

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