Research

Using business rules with CICS for greater flexibility and control

How BRMS technology can drive business value for CICS environments

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About Steve Craggs

Steve Craggs has been in the IT industry for more than 25 years, much of that time in IBM. Steve held various positions in the IBM development organization, culminating in becoming the Worldwide Executive in charge of IBM's MQSeries middleware, now renamed as WebSphereMQ. Steve has been an independent consultant and analyst for the last 7 years, and is recognized as one of the leading authorities in the world on business integration software and solutions, and middleware in general. Steve is President of Saint Consulting, a Director of Lustratus and Vice-Chairman of the Integration Consortium, a global not-for-profit group for furthering the understanding of integration.

Steve is a regular speaker at shows, events and webcasts in the US and Europe, and is a frequent contributor to a wide range of global IT publications. Steve publishes research and reports at http://www.lustratus.com/ and blogs on infrastructure technology at http://www.lustratusrepama.com/litebytes.

Executive Summary

As organizations strive to maintain competitiveness and control costs while driving new channels, markets and opportunities, the need for flexible IT systems that can quickly and effectively support these initiatives has grown more urgent. Just as companies have flattened their organizational structures to speed agility and responsiveness while reducing costs, they also desire a tighter linkage between business needs and IT deployments. The multiple steps between a business requirement being voiced and final delivery of the corresponding IT solution reduce business flexibility and leave too much room for error. Business rules technology has emerged in recent years as a way of addressing this problem, giving business units far greater control over operational execution while at the same time making IT's job easier.

BRMS (Business Rule Management System) technology is designed to allow business rules to be separated from the rest of the application programs so that they can be dynamically updated as the needs of the business change. However, the critical point about business rules is that they are designed to be written in business vocabulary rather than technical programming languages. This is essential to achieve the full extent of the benefits offered by BRMS. The idea is that a non-technical, business-oriented professional should be able to understand the rules clearly, allowing them to be both validated against business or regulatory requirements and updated as needed. To illustrate, supposing a retail company has a business rule that governs loyalty scheme points. If the business decides it wants to offer double points in the month of December, all that is required is for the rule to be changed to say "if purchase date is in December, then points credit = normal points credit x 2". More advanced BRMS users may even start to simulate various rule changes to identify the effects they would have on business results, so that rules can become highly optimized for business effectiveness. A further cost and efficiency benefit of this abstraction of business rules from programming code is that the rule only needs to be changed in one location. It might be that many IT systems within the organization calculate loyalty points. If each system is integrated with the BRMS, then a single change in the business rule in one location has the effect of changing the behaviour of every system to accrue double points without the complexity of multiple programming changes and testing.

For major CICS users, BRMS technology is particularly exciting. Many companies are struggling to cope with the retirement-based attrition of CICS-skilled programmers, and this is putting greater strain on maintaining the IT flexibility in these systems to drive the business forward. But BRMS technology offers the potential for making legacy CICS systems more flexible, efficient and responsive, ensuring their continued contribution and extending their life. In addition, extracting the existing business rules from the CICS programs and documenting them in plain language enhances the visibility of the current operational implementation, hence aiding with compliance management and reducing risk.

CICS users should certainly take a look at BRMS as a way of ensuring new levels of return on legacy investments. However, it is important to appreciate that the business rules concept will be new to both technical and business communities. Working practices will need to change, and organizational responsibilities may end up being realigned. Companies should ensure that they move towards their BRMS goals with at least one eye on the maturity level of the organization with regard to business rules and their use. The Lustratus BRMS Maturity Model included in this report offers guidance to help management plan for a journey to success.

Introduction to BRMS

BRMS (Business Rule Management System) technology is designed to make it possible to drive IT application execution based on a collection of 'business rules'. In essence, these represent the encapsulation of pieces of business decision logic that currently reside within the applications. Business rules have the added advantage that they are written in the language of business, and hence can be more easily understood by business analysts and other business-oriented users – in effect, they are like a documented description of what the program logic is actually going to do in business terms. A BRMS makes it possible to build these rules, and also enables changes in these rules to be reflected in ongoing operations.

A simple example illustrates the concept. A business rule might govern how much commission is paid to a channel partner for a sale, based on factors such as the size of the sale, particular featured products included in the sale and the channel partner's annual level of contribution. The logic to implement this rule is currently implemented in the CICS program that handles commission calculations. Using a BRMS, this rule would be documented in an external rule repository in business language, as opposed to lines of code, and then executed at the relevant stage of the CICS transaction. If the calculation needs to be changed, for example to include a commission bonus for sales in a particular geography, then the business rule is changed accordingly and this is reflected in the operational system.

Although this trivial example helps to show the value of business rules, in reality the business operations covered by CICS applications are likely to be far more complex. It is important to appreciate that although business rules are the building blocks of a BRMS implementation, the end product is often a business *decision* rather than *rule.* It is this decision that is of most interest to the business user, and in many industries these decisions can be complex, involving multiple different but interacting business rules.

Why is BRMS important?

It may already be clear how a BRMS can deliver value to organizations. The keys are that the new business rules are written in business language, and that there is a linkage between changing the rules and these changes being reflected in operational execution. As a result, business professionals can change execution logic by editing rules they can understand, without requiring a programmer to develop new code. In addition, it is much easier to validate that application execution maps precisely to business requirements. The result is enhanced agility in being able to respond more quickly to business change, lower costs through reduced effort and opportunities for reuse, better accuracy of execution and improved governance and control, for example in terms of compliance.

Business agility	•Business professionals can address new business needs without requiring developers to write or modify code
Lower costs	•Less effort is required to make changes, and rules can be shared and reused
Accuracy of execution	•Business rules link directly to execution logic, removing the opportunity for human error or misunderstandings and ensuring the same rule is used everywhere
Improved control	•Because business logic is documented in business-language rules, it can be easily validated and audited, for example to ensure compliance

Figure 1: BRMS benefit areas

Before moving on to look at the IBM BRMS implementation, it is worth clearing up any possible confusion between BRMS and BPM (Business Process Management). Both technologies offer ways to control IT-based operations dynamically; offering flexibility, agility and better alignment of IT to match business needs. However, while BPM deals with processes, BRMS deals with logic based on a particular execution instance. So BPM may orchestrate the flow of components making up the process to handle payments to partner channels, but the calculation of the commission due to a particular channel based on the type of channel, annual volumes and other variables is covered by business rule. BRMS and BPM implementation can and do coexist and add value to each other.

IBM WebSphere ILOG JRules BRMS

IBM's BRMS solution is based on the acquisition of ILOG, a market leader in BRMS solutions with its JRules products, and is now part of the WebSphere family. The IBM WebSphere ILOG JRules BRMS solution consists of the following main components:

Component	Purpose
WebSphere ILOG Rule Team Server	Web-based environment for authoring, managing, validating and deploying business rules, together with a rule repository
WebSphere ILOG Decision Validation Services	Rule testing, simulation and validation capabilities that are integrated directly with Rule Team Server, Rule Studio and Rule Execution Server
WebSphere ILOG Rule Solutions for Office	Rule authoring and editing with Microsoft Office Word or Excel. Works in conjunction with WebSphere ILOG Rule Team Server.
WebSphere ILOG Rule Studio	Rule authoring and editing in an Eclipse-based studio environment, for the more technically minded user
WebSphere ILOG Rule Execution Server	A J2EE-compliant rules deployment and execution environment which runs within a Java-based application server
WebSphere ILOG Rules for COBOL	Converts rules that are managed in the rule repository into a COBOL sub-program that can be run natively in legacy COBOL environments

Figure 2: WebSphere ILOG JRules BRMS family

Summarizing, the IBM BRMS solution allows rules to be written and edited from a number of different environments, depending on the user capabilities and desires; the Rule Team Server business-oriented environment, Microsoft Office or a more technically-oriented Eclipse-based IDE. These rules are stored in a repository which is managed by the Rule Team Server, and deployed and/or executed by the Rule Execution Server running under a Java-based application server such as IBM WebSphere Application Server (WAS). Prior to usage, new or changed rule sets can be tested, simulated and validated by either business or technical users with Decision Validation Services. Finally, rules can be converted into COBOL and compiled for native use.

How are the rules executed?

There is a critical point to understand before looking at what WebSphere ILOG JRules BRMS means in a CICS environment, and that is the different rule execution options. There are primarily three ways to execute a piece of decision logic documented by a JRules rule in CICS:

- By sending an XML message via MQ to the WebSphere ILOG Rule Execution Server
- By invoking a web service hosted by the WebSphere ILOG Rule Execution Server
- By executing the COBOL component generated from the rule by WebSphere ILOG Rules for COBOL

In the first two cases, the rule execution takes place within the application server environment in which the WebSphere ILOG Rule Execution Server is running – quite likely to be IBM WebSphere Application Server (WAS) for z/OS. In the third case, execution happens in the native COBOL environment. There is actually a fourth option, but it is less appealing for the COBOL CICS user. It is possible to run a limited version of the rules execution functionality on a CICS JVM, but since this runs as a Java application under CICS it is not well suited to CICS COBOL environments.
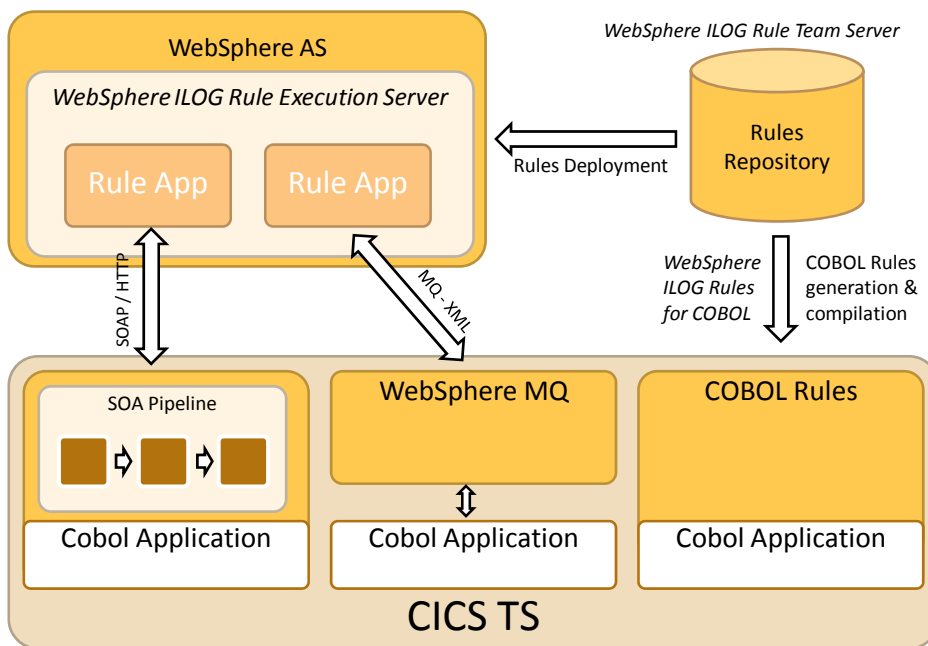

Figure 3: The three main options for use of ILOG Jrules with CICS applications

CICS and JRules BRMS

The BRMS approach can have real appeal to CICS users. It actually achieves two things – it drives additional value from the previously discussed benefits such as agility and control, while at the same time helping to preserve and reinvigorate the life of existing CICS investments. This has to be good news both for the business and for the IT CICS specialist staff. Of course, the move to BRMS requires time and effort, and as such it is important to prioritize activities in order to ensure a strong business justification for the changes. Organizations that try to simply work through all their CICS applications to strip out the rules and place them under control of the BRMS will almost certainly face significant problems. Instead, organizations should look for situations where

- Business rules change regularly – for example monthly or quarterly
- Business rules are well-understood (for example part of corporate policy or regulatory requirements)
- Business execution accuracy is paramount, perhaps to mitigate business risk
- Business decisions are based on complex sets of rules

Looking at this list, it is no surprise that prime industry verticals already driving the growth in BRMS solutions include Banking, Insurance and Government.

The practicalities of BRMS for CICS

In order to ensure a clear understanding of what is required for CICS installations to adopt the BRMS approach, it seems worthwhile to go through the process in steps.

1. Agree the terminology translation table between existing CICS applications and the business rules
2. Document and record the existing business decision logic implementation in business rule terms
3. Decide on the most appropriate technique for business rule execution
4. Set up governance procedures to ensure the appropriate level of control

Agreeing the terminology

This is an essential part of implementing a BRMS solution, because the whole point is that business rules should be in non-technical, business language – but at the same time these business rules must be able to be reflected back into application implementation. Therefore, a mapping has to be agreed between the variables used by the CICS programs, and the business meaning of these variables. It may be that the organization already has CICS COBOL copybooks of all the fields in use, and if this is the case then the copybook can be imported to the Rule Studio IDE ready for the 'translation table' to be put in place. If there is no copybook, then the process just becomes a little more manual. However, in both approaches, the real work will be done by a set of mixed or hybrid business and technically skilled people who will agree on the mappings / business vocabulary and then record them.

Documenting existing rules

Once the terminology is agreed and recorded, then a piece of CICS COBOL program logic can be recreated as an equivalent business-oriented rule or set of rules. Even if the program variables are all conveniently defined in a COBOL copybook, there is still manual work to be done here. The technical and business communities need to work together to ensure that the rules that have been selected to be moved into the BRMS repository are correct, and accurately reflect what the CICS program currently does. The person driving this activity will probably determine which of the various rule authoring tools is used to create and edit the rules, at least initially. If the work is being done by primarily technical people, they may well feel more comfortable with an Eclipse-based tool, and therefore they would use Rule Studio. Alternatively, a less technical group might prefer to use the collaborative, web-based interface offered by the Rule Team Server.

Rule implementation

So far, the whole process has been non-invasive. All that has happened is that the current logic has been mapped to the business rule it implements and this has been recorded in the repository. However, the next step is to actually start sourcing this rule-based logic from the BRMS technology. Initially, of course, this will just result in exactly the same execution, but now the way is open for future rule changes to be deployed to the operational CICS system. However, it is at this stage that the organization will want to decide how to achieve this, and how much and at what point it wants to control such deployment activities. As mentioned earlier, there are three choices for deployment and execution – make a direct XML call or web service invocation to the Rule Execution Server or drive the rule in the native CICS COBOL environment as part of the application execution.

The approach that most closely resembles current operations is the last of these three. Here, the Rules for COBOL product is used to generate a COBOL sub-program representing the execution of the desired rule. The mapping dictionary will ensure that although the rule is written in business terms, the COBOL sub-program will operate with the variable names expected by the CICS application. This COBOL sub-program must now be compiled before deployment, although once this is done the object code can be picked up dynamically by the CICS applications. The old piece of code that carried out this operation can be removed, since it has now been replaced by the instantiation of the rule provided by the BRMS technology. This approach ensures that operations remain in the CICS COBOL world, but of course the drawback is that any changes to the business rule through the BRMS tools will not be picked up by the operational system until the COBOL code generated

from the new rule is recompiled. However, this does ensure that IT still has control over when new changes are deployed.

For companies that have decided on a service-oriented architecture (SOA), perhaps the most appropriate option for implementing the BRMS-specified rules is through the use of a web services invocation. The desired rule is deployed to the Rule Execution Server as a web service, allowing it to be invoked as required by the CICS COBOL applications. This approach comes with all the usual advantages and disadvantages of making web service calls from CICS applications. Note that the web service runs in the application server environment hosting the Rule Execution Server, and therefore this approach requires the presence of WAS for z/OS, WAS on another platform or some other J2EE-compliant application server.

An alternative approach that avoids the use of web services technology from the mainframe COBOL application is to use the XML invocation to the Rule Execution Server through its MQ interface. Just as with the web services option, this requires the use of a suitable application server environment to host the Rule Execution Server. However both the web services and the XML invocation approaches mean that new rule changes are made available dynamically, without any requirement for a COBOL recompilation.

Business rules governance and control

Reference has already been made to the need to ensure that only approved rules are deployed for execution. This is particularly important in the case where rules are invoked as web services or through the XML interface, since once these are approved they will automatically become 'live' on the next invocation. At least in the case where the Rules for COBOL approach is being used there is another gate of approval in the form of the need to recompile the rule-generated COBOL code.

The Rule Team Server has numerous excellent facilities for collaboration on rule creation and update, and it also contains lifecycle management capabilities such as versioning to allow the proper governance procedures to be put in place. In addition, the Decision Validation Services component provides a test harness to test and validate rules before approval for deployment, directly integrated within Rule Team Server.

Advanced considerations

As more rules are brought under BRMS control, some users might want to start simulating rules changes and analysing the impact, in much the same way that BPM users analyse prospective process changes. The Decision Validation Service provides this capability in addition to rule testing. This can provide great benefits in terms of delivering reliable service levels and optimizing rules, but successful use of these techniques often requires a fair degree of maturity and experience in rules usage together with the ability to marry business and technical skills. The Rule Solution for Office component offers another attractive option for rules authoring and editing, particularly for the business community. As business users get more involved in the rules process, this tool provides an interface for rules inspection and editing from Microsoft Office Word and Excel.

The BRMS maturity model

The previous comments touch on a more general discussion relating to how an organization might go about utilizing BRMS technology with CICS, and how that usage might evolve. There are a number of factors arising from the combination of business rules with an IT-heavy environment such as CICS that create significant challenges for companies as they move towards the widespread use of business rules. The cross-over of business and technical skills requirements, for example, can require considerable adjustment; the new approach can seem somewhat alien to CICS developers, while business-oriented professionals have to learn that seemingly low-impact changes can have far-reaching consequences in real-time operations.

As a result, most organizations like to proceed based upon their own growing level of maturity in handling business rules with CICS, with a particular eye on mitigating risk throughout the process. Lustratus has developed the Lustratus BRMS Maturity Model as a guide, summarizing the BRMS journey in a number of well-defined stages, as indicated below.
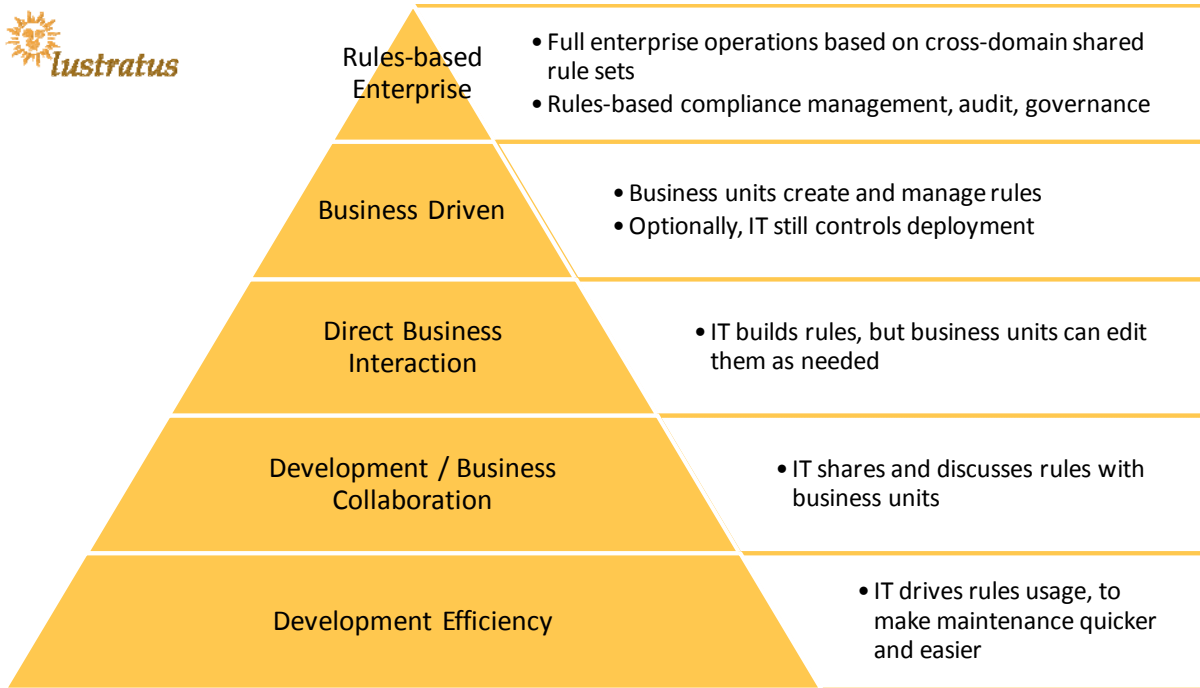
Figure 4: The Lustratus BRMS Maturity Model

The model shows a growing level of experience and understanding that moves from a start of developer-led rules pilots all the way up to the full, rules-driven enterprise. It is important to note that it is not required to get to the top of the maturity pyramid before the BRMS benefits can flow - there is business value created at each level.

Most CICS organizations will probably start at level one of the maturity model. Once a company has decided that it wants to start to adopt BRMS technology, and the tools are in place, developers will probably start work on one or two pilot rules to gather experience and reduce the ongoing maintenance load. The business community will need to be involved as the business vocabulary starts to be developed, but beyond that the developers will probably want to use the Rule Studio Eclipse-based development tool to try to extract and record the COBOL logic representing the rule. At level one, it is highly likely that IT will be the instigators and drivers of any rules-based activity.

Once some rules have been created and deployed, organizations are likely to find a fairly quick movement to maturity level two, as developers start to share the documented rules with the business community. This is a great way to get confirmation that existing functionality is doing what the business needs, and also getting the business community used to seeing the rules in the new business vocabulary. There is likely to be some substantial refinement of the business vocabulary at this stage.

The next stage is for some business professionals to start implementing alterations and changes to rules. It is likely that this will be done with the Rule Team Server, since this is probably a more familiar environment for the business user. However, although the rules are starting to be updated by business experts, it is almost certain that IT will want to keep a tight rein at this stage on rules deployment to ensure that service quality is maintained.

As business users become more skilled in the use of business rules, they may start writing their own rules and testing them, or even simulating changes so that the impacts can be assessed. At this stage of maturity, control is starting to pass much more to the business community, but even so it may be that some IT organizations will continue to insist on keeping the final deployment in the hands of IT. The final level of maturity describes an enterprise that has business rules embedded in its operational psyche, with shared, cross-domain, reusable

rule-sets that are used to drive operational business decisions, improve agility and increased business effectiveness.

Summary

With its acquisition of ILOG, IBM has established a comprehensive BRMS solution to meet enterprise needs across a whole range of environments, including the mainframe. CICS users have a variety of rule implementation options to consider, depending on internal policy and objectives; use a web services interface to fit in with an overall service-oriented architecture (SOA), invoke rules directly through an MQ interface or handle the new rules natively within the CICS COBOL application. But regardless of the choice, the outcome is that the business rules underpinning operational decisions and policies, currently locked away in COBOL programs, become visible and editable by technical or business users.

The result is that organizations with heavy CICS investments can extend the life and value of these investments by making them more easily adaptable and flexible to market changes. Rules are recorded, viewed and edited in straightforward business language, not only offering a much more flexible platform for business agility and change but also providing the opportunity for management to confirm operational accuracy and compliance, with both business policy and external regulations.

So CICS and BRMS technology make a powerful combination for just about any user. As IT organizations start to get familiar with the rules already in place and the IT and business communities collaborate on the business vocabulary to describe these rules, the overall understanding over these key elements of business operations will grow. The non-technical interfaces offered for editing these rules, such as the Microsoft Office-based option for use from Excel or Word, provide a non-threatening environment for business users to start implementing their own rules changes. Eventually companies may even reach the fully rules-driven enterprise, where shared sets of rules control and govern business decisions and activity across all domains of the enterprise. However the good news is that even in the early stages of rules transformation there are significant benefits to be had, so CICS users would be well advised to start taking a look now at this exciting new approach to delivering IT-based business value.

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