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# Must You Choose Between Business Rules And Complex Event Processing Platforms?

by Charles Brett and Mike Gualtieri

for Application Development & Program Management Professionals

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# Must You Choose Between Business Rules And Complex Event Processing Platforms?

Understand The Sweet Spots Of Each To Make An Informed Decision

by **Charles Brett and Mike Gualtieri**

with Mike Gilpin, John R. Rymer, and Wallis Yu

## EXECUTIVE SUMMARY

How can you choose between investing in a business rules platform and a complex event processing (CEP) platform? The answer is not as easy as saying “a business rules platform is for rules” and “CEP is for events.” Each platform strives to facilitate more-agile application development by providing specialized tools that enable both developers and business users to externalize business logic. Each platform, however, takes a different approach and is optimal for certain kinds of business problems. To confuse matters, both use similar terminology — for example, “rules” — which makes understanding the differences and where to use each that much more difficult. Nevertheless, there are clear differences, and understanding these differences will help application development professionals use either business rules, complex event processing, or both, where appropriate.

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## NOTES & RESOURCES

Forrester interviewed or talked with more than 15 vendors, including Fair Isaac, IBM, ILOG, Progress Software, Senactive, and more than 20 user organizations.

### Related Research Documents

[“Best Practices: Blazing Fast Web Site Infrastructure”](#)

August 15, 2008

[“Case Study: How Msnbc.com Is First In News”](#)

August 15, 2008

[“The Forrester Wave™: Business Rules Platforms, Q2 2008”](#)

April 8, 2008

[“What Are Events, And Why Do They Matter To Application Development Professionals?”](#)

February 29, 2008

[CEP Adoption Is Broader, Deeper, And More Business-Driven Than IT May Expect](#)

January 31, 2008

## CONFUSION STEMS FROM AMBIGUITY

Understanding the differences between business rules and complex event processing (CEP) is not as easy as relegating rules to business rules and events to CEP. Both platforms possess the concept of *rules* that determine how the platform should process incoming information. Similarly, both platforms consume incoming data that may represent an event.

This makes selecting either business rules or CEP difficult, and buyers who do not know of the existence of both categories risk making a less than efficient or appropriate choice. Yet this ambiguity is something that most vendors of both categories do not seem keen to illuminate. Vendors of both platforms have further fueled the confusion (it would seem inadvertently rather than deliberately) by declining to lucidly explain the differences and why a buyer should choose one or the other. Given that most vendors sell either CEP or business rules platforms, this is not that surprising.

To make matters worse, in many case studies as well as customer implementations, Forrester finds that where one platform type was used, the other platform type (at least conceptually) *could* have been used, albeit not necessarily optimally. This suggests that the differences may be significantly less marked than the protagonists of each platform type might wish. For example:

- **A CEP solution could have been implemented using business rules.** In the Forrester Case Study on a solution to prevent *Violencia de Género* (gender violence) where CEP was used, it is Forrester's analysis that a business rules platform was a realistic alternative approach that could have worked.<sup>1</sup> How? The incoming global positioning events of a potential perpetrator could be represented in an object model that would then be passed to business rules to determine if the perpetrator's proximity to the victim is closing to an unacceptable degree. If so, the rules would then trigger the appropriate level of alert. Implementing this in business rules would be challenging because the object model would have to support the temporal state and aggregation of pairs of global position events (and derive speed). The inherent ability of CEP platforms to handle the correlation of temporal as well as other events is what makes CEP an easier implement for this solution than business rules.
- **A business rules solution could have been implemented using CEP.** In Forrester's research on using business rules to determine a prospective new customer's risk of money laundering, CEP could have been an alternative solution.<sup>2</sup> How? The business rules application data object could be an event that a CEP platform would then consume (the event handler would run rules against the event, which would then generate output data in the form of a low, medium, or high risk determination). Such a CEP implementation would not exploit all the capabilities of a CEP platform — especially its ability to process a high volume of simultaneous events and correlate events temporally.

The expression of the rules in CEP would also tend to be more complex — more like rules produced in a programming language. One advantage (thus far) of the business rules platforms is that they provide varied authoring metaphors (such as flowcharts, decision trees, decision tables, scoring models, and textual if-then rules). In this anti-money-laundering application, using business rules was a better fit since: 1) CEP is overkill because event correlation is not necessary and 2) business analysts can create and maintain the necessary rules within a business rules platform.

## BUSINESS RULES AND CEP ARE BOTH CAPABLE PLATFORMS

Application development professionals can use either platform to build Dynamic Business Applications that are capable of handling constant change.<sup>3</sup> Compared with development in conventional programming languages such as COBOL or Java, the benefit to businesses lies in increased agility, greater transparency of logic, improved compliance, and automation of otherwise complex processes — as well as improved understanding of how the business works. These platforms deliver by providing application developers and business users tools for defining input data, expressing business logic without coding, offering new forms of analysis, and integrating with other applications. For example, consider:

- **A business rules implementation of an insurance underwriting process.** Such a process determines the annual premium for a life insurance policy. Traditionally, developers implemented the process in a conventional programming language, such as COBOL. The disadvantage: Every time the underwriting rules changed, a programmer had to change the code. A business rules implementation removes the underwriting rules from the COBOL application and processes them within the business rules platform, where underwriters or business analysts can maintain them without touching the code. This enables faster implementation time for new or changed insurance underwriting rules.
- **A CEP implementation of an equities trading strategy application.** Developers often implement investment-trading strategies in C++. The disadvantage: A programmer has to change the code, and perhaps even the design, every time traders wish to tweak their trading strategy. A CEP implementation of a trading strategy provides two advantages: 1) the CEP platform handles the huge volume of ticker events, freeing the developer to focus on the trading strategy logic and 2) the rules express the temporal logic commonly needed for trading strategies (and the interrupt-driven handlers) and are conducive to expressing parallel logic.

Although both platforms share the same goal of externalizing business logic — so that such logic is easy to change — each platform takes an approach that has roots in the particular approach it adopts to create a software solution and has been shaped by the initial applications that used its technology. Within this context:

- **Business rules platforms have been in use for many years.** Many Forrester clients have deployed these solutions, and they have proven effective. As the Forrester Wave™ on business rules platforms shows, there are multiple vendors with business rules platform offerings, and the business rules technology concept is familiar to most IT organizations.<sup>4</sup> Business rules platforms are most often deployed to support or automate decision management applications — for example, an application that decides whether or not a loan should be approved or one that determines the premium for a life insurance policy.
- **Complex event processing (CEP), by comparison, is relatively new.** There are fewer CEP vendors, and their solutions are relatively recent in terms of availability and maturity. Nevertheless, Forrester’s discussions with a broad variety of organizations indicate that many are introducing or considering introducing CEP. This occurs most notably in business areas (and is not restricted to the financial sector, as some claim).<sup>5</sup>

### Business Rules And CEP Share Characteristics But Are Also Different

The basic anatomies of the two platform approaches are similar. They both:

- **Define incoming data.** While CEP calls input data events, business rules call input data a business object model or sometimes input parameters. No matter what you choose to call the incoming data, both platforms provide tools that enable developers to define and map the data from a source (or sources). The source is typically some other application, but it can also be a stream of data such as a stock ticker or user input from a Web form. CEP vendors designed their platforms to handle voluminous simultaneous events: The notion of an event connotes a smaller “unit” of data (such as tick or moving latitude/longitude reading), and the platform is equipped to handle many of these units arriving in a stream. Business rules vendors designed their platforms to accept single discrete data objects that typically have many more elements in the data payload. For example, an underwriting data object may contain an applicant’s name and address as well as medical information, employment history, and a myriad of other pieces of information that the underwriting process requires.
- **Express business logic.** One of the key characteristics separating a business rules or CEP platform from your friendly neighborhood programming language is that these platforms are truly friendly (at least compared with the formality of COBOL and Java). Today, this is truer for business rules platforms than for CEP — because the business rules platform vendors have been concentrating for years on improving the business users’ interface for creating and maintaining business rules and on providing tools to help users manage those rules throughout their life cycle. The best business rules platforms provide a combination of visual and scripting tools that provide tools for business analysts to define business logic while enabling developers to do any additional necessary “hardcore” coding. That said, both types of platforms provide a means for calling external logic or services during processing. This is necessary when the rule or event handler needs to make an external call, for example, to obtain a credit score from a credit agency.

- **Execute business logic using specialized algorithms.** Both platform types have roots in academic research that centered on using specialized algorithms to process incoming data. Business rules emerged from expert systems in the 1980s with the invention of the Rete inferencing algorithm. Business rules platforms now offer three types of algorithms: inferencing, sequential, and extended sequential.<sup>6</sup> CEP emerged from simultaneous research conducted in the 1990s at California Institute of Technology (Caltech), Cambridge University, and Stanford University.<sup>7</sup> This research emphasized the significance of temporal correlation and induced several start-ups — Apama (now part of Progress Software), Aptsoft (now part of IBM), Coral8, Senactive, StreamBase Systems, and several others — to begin investing.
- **Generate output and take actions.** In both CEP and business rules, processing the business logic results in output data. The output data either is returned wholesale to the calling application or is passed onto another application that the CEP or business rules platform calls.

### Business Rules And CEP Also Complement Each Other

Credit card fraud is another context where either a business rules platform or CEP is a possible solution. Credit card processing means high transaction volumes since millions of customers are using their credit cards at any moment. Identifying credit card fraud requires the processor to detect suspicious patterns and then to apply some set of rules to determine the likelihood of fraud. A typical fraud scenario would occur when a credit card charge for a fine dinner in Lisbon happens first, then two hours later there is a purchase of an LCD TV in Los Angeles made with the same card. When choosing a platform, the credit card company could decide that:

- **A CEP platform is a natural fit.** The main reason to choose CEP over business rules would be because of the high volume of credit card transactions plus the need to consider combinations of transactions over time.
- **A business rules platform makes sense.** A company might choose a business rules platform primarily because the rules it would need to apply to search for fraud would be relatively straightforward to describe and then to implement and maintain in a business rules platform.
- **A combination would work best.** A combined approach would provide the strengths of each platform, thereby enabling broader temporal or geographic analyses to combine with the ability to exploit the tools maturity of business rules platforms to enable business analyst involvement.

Most credit card companies today use business rules platforms to detect credit card fraud. This is primarily because business rules platforms have been around longer. The question now is whether one type of platform or the other would be best suited when both are available and applicable.

## UNDERSTAND THE SWEET SPOTS IN ORDER TO MAKE AN INFORMED DECISION

Trying to determine whether to use business rules or CEP requires that application development professionals understand the strengths and weaknesses of each approach as well as how they can best apply the capabilities of each approach to solving the types of problems they face. It also requires thought about both the upstream sources (input) and downstream (output) consequences of their processing.

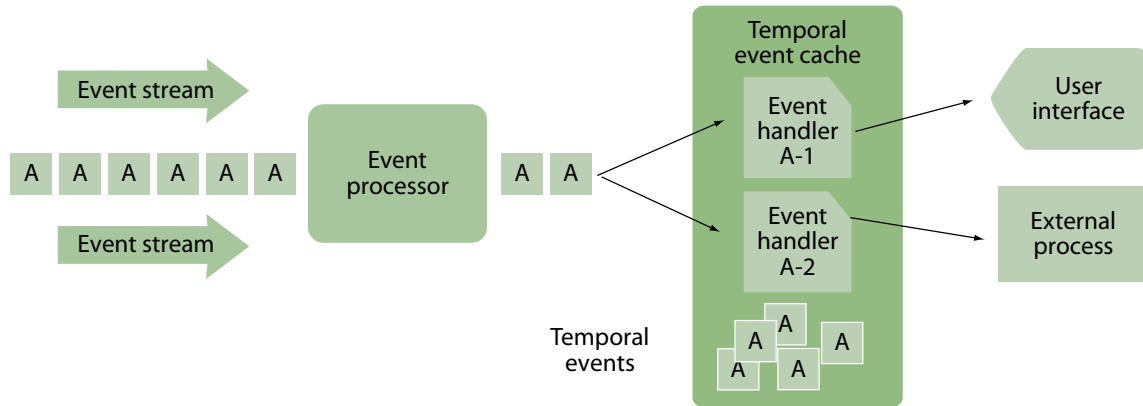
In addition, business rules and CEP do not exist in isolation. They are part of a broader IT and application architecture — even if business users do not automatically appreciate this. To facilitate an understanding of the broader picture, this report will describe general principles of situations where CEP is relevant, others where business rules are relevant, and others where both are relevant.

### Use CEP To Correlate Across A Voluminous Stream Of Incoming Events

The uniqueness of CEP lies in its ability to correlate events, which means recognizing a relationship between two or more events. Choose CEP if you need to:

- **Handle high-frequency throughput.** One of the sterling characteristics of CEP platforms is their ability to process a fast stream of information events — such as a stock ticker or moving GPS location data. Even if the application processes just one event type, as would be the case with an application receiving data only from a stock ticker, processing events at a breakneck rate (measured in thousands or multiple tens of thousands of events per second) requires a platform optimized for that purpose (see Figure 1).
- **Recognize, correlate, and process different types of events.** The “complex” part of CEP is its capability to recognize relationships among many different types of events or among large numbers of the same event type. CEP is interrupt-driven by intention: Events enter the system, and the system then delivers them to one or more event handlers that execute logic to process those events (see Figure 2).
- **Support temporal correlation of events.** Some events occur simultaneously, but more often than not, they occur chronologically. CEP engines have the ability to exploit a chronological record of events so that rules recognize patterns of events on a timeline (and after the event). For example, a trading strategy might recognize an options-pricing event at time T seconds and a stock-depth event at T+10 seconds. A trading strategy might call for an action only when, for example, two such specific events occur within a 20-second time frame.

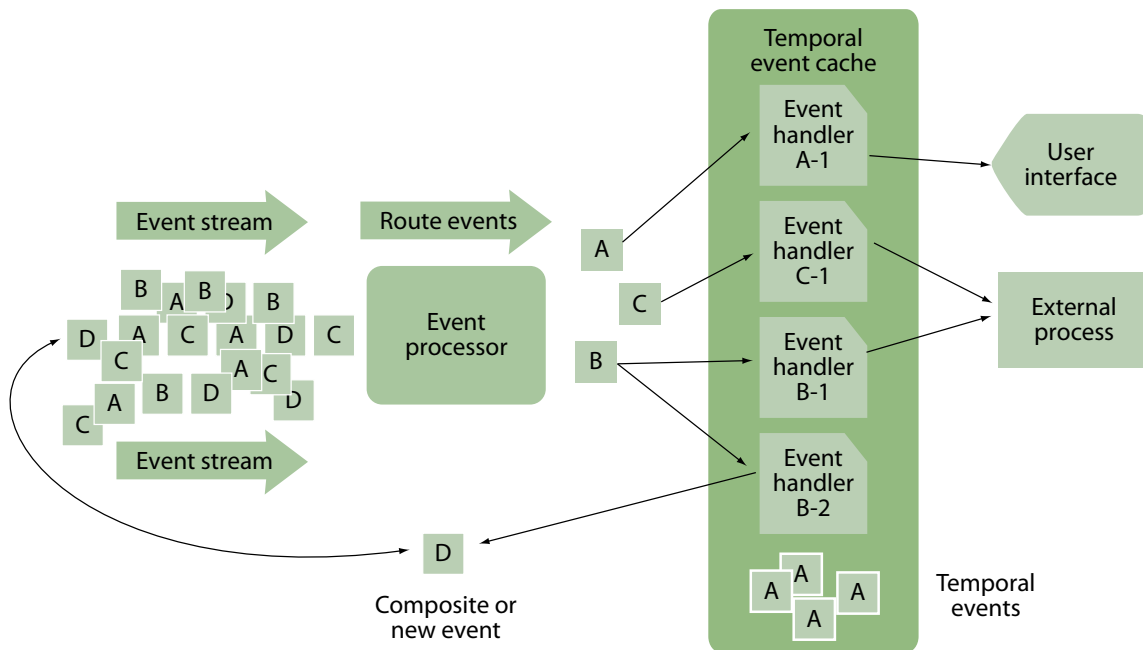
**Figure 1** A Single Event Type Is Processed By Two Handlers



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Source: Forrester Research, Inc.

**Figure 2** Multiple Events Can Be Processed By Handlers And Create A New Event



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Source: Forrester Research, Inc.

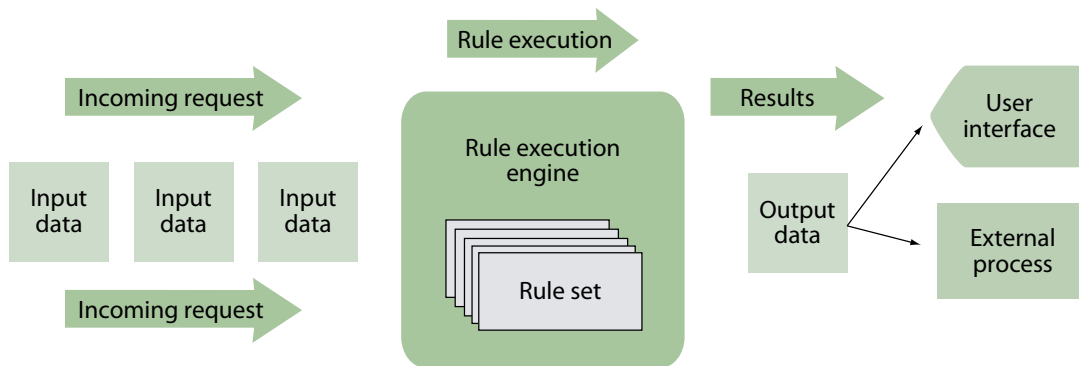
### Use Business Rules Platforms To Automate Decisions

Application development professionals often create business rules applications to automate decisions or to make a determination based on a discrete, independent set of incoming data such as a credit risk rating, a loan approval, a list of due diligence tasks, or a pricing decision (see Figure 3). In contrast to CEP, business rules typically process a single incoming data payload. Although additional data can be retrieved on demand, there is no correlation to other incoming data.

Choose business rules if:

- **You do not need event correlation.** If in your situation, it's fine for the business logic in your application to process each transaction independently of the next, then you don't need the temporal correlation that CEP provides.
- **You need to enable business users to author and maintain rules.** Business rules platforms have more-mature authoring and life-cycle management tools for business users.

**Figure 3** Business Rules Platforms Execute Rules On Incoming Data To Render A Decision



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Source: Forrester Research, Inc.

### Use Both CEP And Business Rules If You Need Capabilities From Each

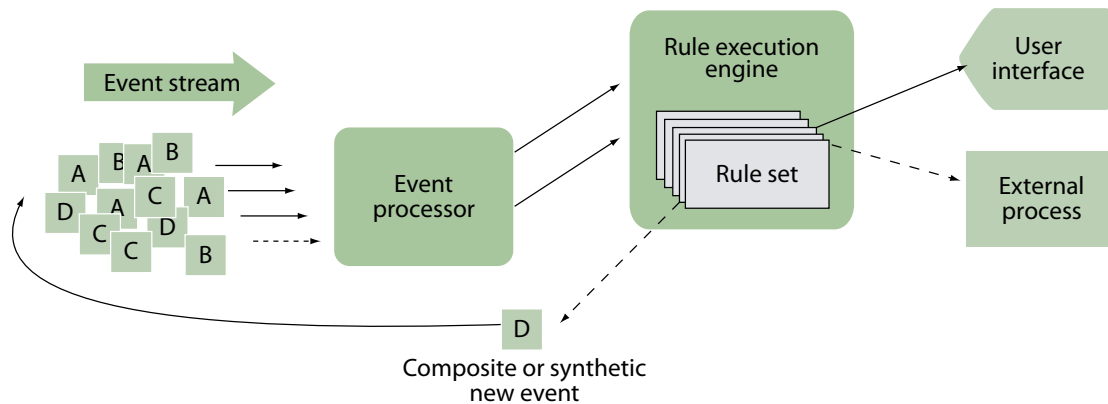
It is entirely conceivable that an organization can benefit from combining use of business rules and CEP. If the need is to find correlations between events and, once those correlations exist, execute specific rules to determine what action to take, then deployment of both types of platform may make sense (see Figure 4). Beneficial scenarios for using both CEP and business rules include those in which:

- **CEP finds correlations that trigger business rules.** A CEP application can find a correlation from streaming events, triggering an action to pass the data onto a business rules application. For example, you could implement a CEP application to detect potential credit card fraud by correlating charge card events. For example, in the case of the credit card fraud detection scenario, if the time between the restaurant charge made in Lisbon and the retail store purchase

of the LCD TV is less than the flying time from Lisbon to Los Angeles, then the system should flag the account, as one or both credit cards uses are potentially fraudulent. CEP would recognize this as potential fraud because the card could not be physically present in both places within the time span between purchases. The CEP application would then trigger an action to put the card on hold while the organization investigates both transactions.

- **Business rules create events that feed CEP.** A business rules application can generate an event that the system can then channel as an input to a CEP application. For example, a lender could use a business rules application to approve a loan application. On approving the loan, the business rules platform could generate an event and send it to the CEP application that monitors capital requirements and lending risk.
- **A CEP-based app needs an expressive way to define processing rules.** When a CEP application is used to define and process events, business analysts may find either that the event processing language and tools are too difficult to use or that the application does not offer an inferencing algorithm that they require. One way to address this issue is to embed business rules in the CEP application's event handlers. However, there is a risk in this usage that the business rules processing engine could slow processing too much for the event handler to stay within its available time budget — depending on the algorithm used and the implementation.

**Figure 4** Business Rules And CEP Can Complement Each Other



## RECOMMENDATIONS

### BEGIN BY DETERMINING IF YOU NEED CEP

- **Choose CEP if you need it.** Business rules cannot compete with CEP when it comes to processing huge volumes of high-frequency events that also require temporal correlation and concurrent event handlers. If your application has these requirements, the choice is easy — you should choose a CEP platform.
- **Choose business rules if you do not need CEP.** If your application does not need CEP, choose a business rules platform to handle your rules requirements.
- **Consider both if you choose CEP.** If you choose CEP, then you need to evaluate whether or not your application could also benefit from including a business rules platform. This is a more expensive and more complicated implementation because you will have to buy two platforms and have two implementation projects. The impetus for adding a business rules platform to your CEP solution should be the need to let business users change rules that take the result of a CEP correlation as their input. You could have your developers “code” these rules using the CEP platform tool, but business rules have much more mature rule authoring tools that are geared toward business users. Few CEP platforms are as advanced as business rules platforms in the way they support nontechnical business users. Carefully evaluate the rule-authoring tools that your CEP platform provides to determine if your business users can author and maintain rules.
- **Consider both as an architectural decision.** A decision to buy both may also be appropriate if you are deciding, as an enterprise architect, to provide both CEP and business rules functionality for developers to use across multiple projects with requirements in one or both areas.

## WHAT IT MEANS

### COMBINED CEP AND BUSINESS RULES WILL EVENTUALLY EMERGE

A combined CEP and business rules platform will emerge because it will be more attractive than buying and implementing two distinct ones. Customers would benefit because they could have one platform that could support event-correlation and decision-management applications with common or similar tooling. Indeed, delivering a combined platform would not be that difficult: A CEP vendor could partner with a business rules platform vendor — or vice versa. Most CEP vendors are already keen to improve their authoring tools for business users, and some business rules platform vendors are thinking about how they can incorporate CEP (as discussed with Forrester). With IBM acquiring ILOG (business rules) and Aptsoft (CEP), for example, there is evidence that consolidation has begun.

Nevertheless, CEP and business rules will continue to exist separately for the time being — not in the least because of pricing (in all probability a combined platform would initially be more expensive, although in the longer term it would cost less than buying both a CEP and business rules platform separately).

Enterprises that buy a combined platform will make the decision not only because of costs but also because it will be a solution that allows them to:

- **Obtain a simplified architecture, with one platform instead of two.** One platform means fewer servers, fewer support agreements, and fewer service-level agreements.
- **Have only one implementation team — rather than two.** With one platform, customers can establish a single implementation team instead of two — each with different skills sets.
- **Solve problems with the most appropriate approach.** Instead of having to decide which platform to use, customers will decide which capabilities of CEP and business rules to use to address each specific business problem.

The confusion regarding CEP versus business rules is reminiscent of the occasional confusion between business rules and business process management (BPM). When BPM vendors started offering “rules” capabilities, customers did not always understand under what circumstances they would also need a rules engine. The same may yet apply with CEP, business rules, and BPM — with the debate having to be reopened in some form.

## ENDNOTES

- <sup>1</sup> Forrester used this example of a CEP implementation to examine (conceptually) if business rules processing would achieve the same results. See the November 7, 2007, “[Using Event Processing To Prevent Violencia De Género \(Gender Violence\)](#)” report.
- <sup>2</sup> Forrester used this example of a business rules implementation to examine (conceptually) if CEP would achieve the same results. See the November 15, 2007 “[Business Rules And SOA Ease The Burden Of Regulatory Compliance](#)” report.
- <sup>3</sup> One of the goals for app dev pros during the next five years should be to invent a new generation of enterprise software that adapts to the business and its work and evolve with it. See the September 24, 2007, “[The Dynamic Business Application Imperative](#)” report.
- <sup>4</sup> Forrester evaluated 11 business rules platform vendors. See the April 8, 2008, “[The Forrester Wave™: Business Rules Platforms, Q2 2008](#)” report.
- <sup>5</sup> Forrester research shows that CEP usage is not confined to the finance sector and that adoption is more extensive than many believe. See the January 31, 2008, “[CEP Adoption Is Broader, Deeper, And More Business-Driven Than IT May Expect](#)” report.
- <sup>6</sup> The Rete algorithm is one of many implementations of an inferencing algorithm. Forrester found that business rules platform vendors offer three types of algorithms: inferencing, sequential, and extended sequential. See the July 24, 2008, “[The Truth About Business Rules Algorithms](#)” report.

<sup>7</sup> Complex event processing has its roots in the academic research of John Bates of Cambridge University, Mari Chandy of Caltech, and David Luckham of Stanford University. See also: David Luckham, *The Power of Events: An Introduction to Complex Event Processing in Distributed Enterprise Systems*, Pearson Education, 2002.

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