



# Decision Management Systems Platform Technologies Report

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# Managing Decision Logic with Business Rules

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*Managing decision logic with a Business Rules Management System (BRMS) for transparency and agility is one of the five key capabilities needed when building Decision Management Systems. Each can be adopted incrementally, and can scale based on resources and business drivers.*

Managed, executable business rules offer many advantages over traditional code, especially when automating and managing decisions:

- ▶ Business rules are easier for non-technical business experts to read, improving business/IT collaboration and improving the accuracy relative to code.
- ▶ Business rules are declarative, allowing each to be managed independently. This simplifies the management and reuse of decision logic while also allowing more precise and granular assessment of consistency, completeness, and quality.
- ▶ Business rules either “fire” (the conditional element evaluates to true) for a particular transaction or they do not. This represents a precise description of how a decision was made, supporting subsequent analysis and improvement of decision-making.

A BRMS or equivalent functionality gives business users and analysts the ability to make routine changes and updates to critical business systems while freeing IT resources to concentrate on higher value-add projects and initiatives. Or when used by an IT organization in a more traditional way, a BRMS allows for more rapid change by making it easier to find, make, and test changes to decision logic.

## Navigating the Report

The [\*Decision Management Systems Platform Technologies Report\*](#) is a set of documents describing the best practices and technologies for building Decision Management Systems.

1. *Introducing Decision Management Systems*
2. *Use Cases for Decision Management Systems*
3. *Best Practices in Decision Management Systems.*
4. Five Key Capabilities
  - 4.1. *Managing Decision Logic with Business Rules*
  - 4.2. *Embedding Predictive Analytics*
  - 4.3. *Optimizing and Simulating Decisions*
  - 4.4. *Monitoring Decisions*
  - 4.5. *Modeling Decisions*
5. *Selecting Products for Building Decision Management Systems*

All readers should begin with *Introducing Decision Management Systems* as it gives an overview of the category, technologies and rationale.

Business and technical readers can continue with *Use Cases for Decision Management Systems* and *Best Practices in Decision Management Systems*.

Business and Technical Track	Technical Track
Introducing Decision Management Systems	Managing Decision Logic with Business Rules
Use Cases for Decision Management Systems	Embedding Predictive Analytics
Best Practices in Decision Management Systems	Optimizing and Simulating Decisions
	Monitoring Decisions
	Modeling Decisions
	Selecting Products for Building Decision Management Systems

Technical readers are recommended to read the five Key Capabilities documents (*Managing Decision Logic with Business Rules*, *Embedding Predictive Analytics*, *Optimizing and Simulating Decisions*, *Monitoring Decisions* and *Modeling Decisions*) to better understand the component technologies of Decision Management Systems. *Selecting Products for Building Decision Management Systems* will be useful as part of assessing technology needs.

More information on the report, its scope, reproduction and more is in the final section **About The Decision Management Systems Platform Technologies Report.**

## Overview

Building Decision Management Systems requires a complete set of software components for the creation, testing, management, deployment, and ongoing maintenance of the logic of a decision—the business rules—in a production operational environment. The most common product category name for this capability is a Business Rules Management System (BRMS).

For the purposes of this report, we are concerned only with executable logic, executable business rules—that is with business rules defined at a level that allows them to be executed in a computer system. Business rules may be defined and managed as a requirements approach and to ensure consistency and accuracy in manual decision-making, but this is not the focus of this report.

Generally, an executable business rule is simply a statement of what action should be taken if a given set of conditions are true. Each rule has a conditional element that can be assessed at a moment in time to see if it is true or false as well as one or more actions to take if it is true. These actions could be as diverse as sending emails or invoking functions but generally involve setting data values. In most BRMSs, each rule can also have an owner, notes, version history, and other metadata that describes it.

Managed, executable business rules offer many advantages over traditional code, especially when automating and managing decisions:

- ▶ Business rules are easier for non-technical business experts to read, improving business/IT collaboration, and improving the accuracy of business rules relative to code. This is especially true because business rules can also be represented in a variety of graphical and tabular metaphors.
- ▶ Business rules are declarative, allowing each to be managed independently and so simplifying the management and reuse of decision-making logic while also allowing more precise and granular assessment of consistency, completeness, and quality.
- ▶ Business rules either “fire” (the conditional element evaluates to true) for a particular transaction or they do not. This can (and should) be recorded each time a decision is made and represents a precise description of how a decision was made. This supports subsequent analysis and improvement of decision-making.

A BRMS or equivalent functionality gives business users and analysts the ability to make routine changes and updates to critical business systems while freeing IT resources to concentrate on higher value-add projects and initiatives. Even when used by an IT organization in a more traditional way, a BRMS allows for more rapid change by making it easier to find, make, and test changes to decision-making logic.

## Architecture

Managing decision logic requires software that supports a range of activities:

- ▶ Integration with other applications and services and linking business rules to data sources so that business rules can be developed that will use the data available in existing systems and processes.
- ▶ The development and testing of business rules by both technical and non-technical users so that all those involved in defining a decision can participate in writing the business rules.
- ▶ Identification of rule conflicts, consistency problems, quality issues and more for both technical and non-technical users so that full advantage is taken of the declarative nature of business rules.
- ▶ Assessment of the business impact of changes to the business rules through simulation and reporting to ensure the right changes are being made and to understand the business consequences of changes that must be made.
- ▶ Deployment of a defined package of business rules to Decision Services in different computing environments.
- ▶ Measuring and reporting of decision and business rule effectiveness based on the results of executing business rules in decision services.

Such a system requires the following capabilities.

## Capabilities

### Rule Management

A business rule management environment suitable at least for technical users is essential. This environment typically also includes design tools to integrate the deployed business rules with the rest of the enterprise computing environment. Generally, this is provided as part of an Integrated Development Environment or IDE, often one based on Eclipse or Visual Studio.

Technical users are generally not the only ones who will need to edit business rules. Interfaces to allow business analysts and business users to manage business rules directly and in-context, or tools to allow such interfaces to be built and maintained, are critical elements of a robust approach to managing decision logic. These interfaces could be part of an IDE, though this is less common, and a thin-client interface is more likely. Some products provide editing environments for non-technical users based on the Microsoft Office products, specifically Microsoft Word and Microsoft Excel.

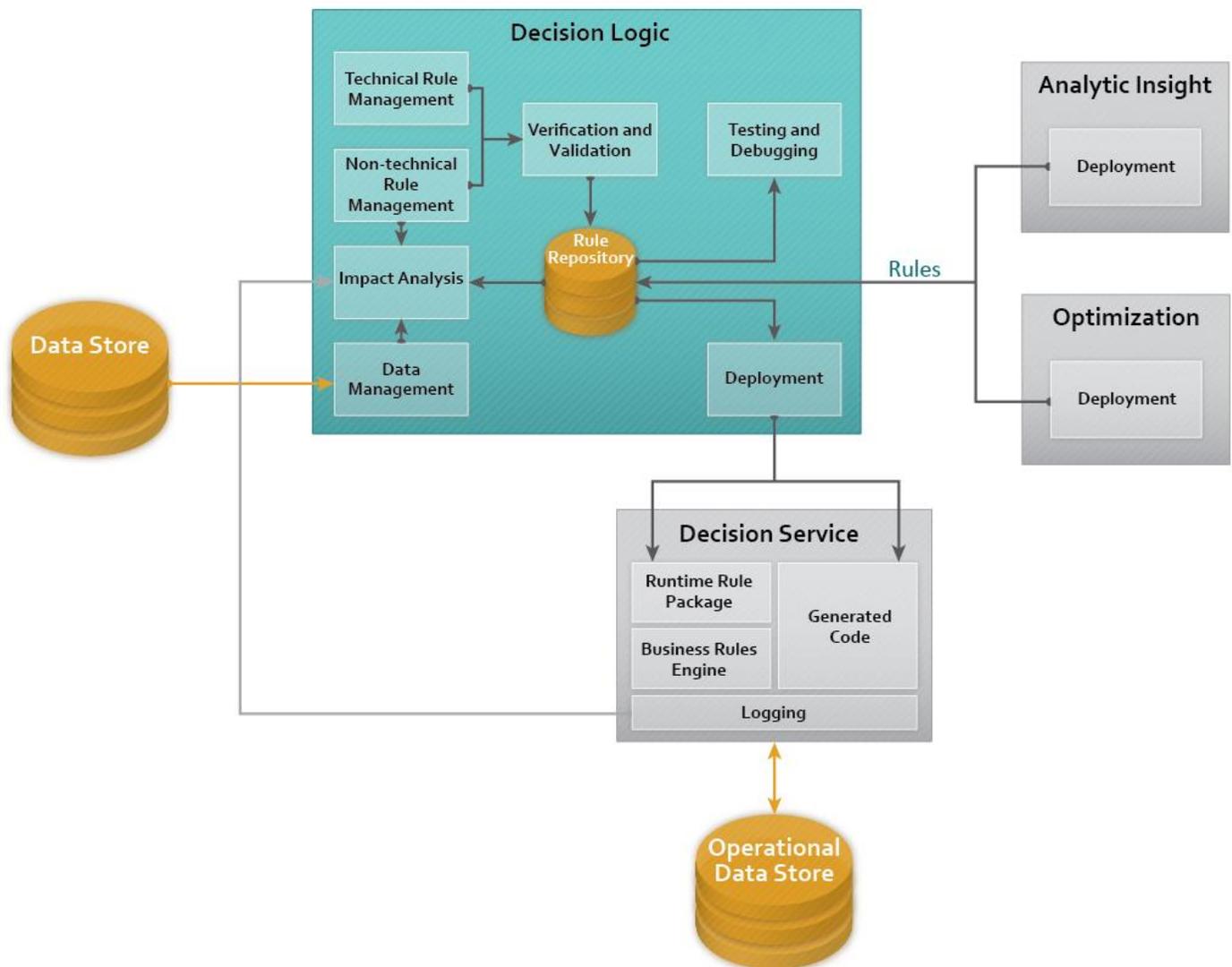
A variety of metaphors are often used to author business rules. A rule flow or decision flow is used to lay out multiple steps within a decision. Business rules can

be specified for each of the steps or tasks in such a flow as a decision tree, decision table, rule sheet, decision graph, decision model, rule family or simply as a list of independent rules. The differences between these metaphors and the value of each will be discussed in a future version of the report.

## Verification and Validation

Verification and validation tools that check business rules for completeness, consistency, and logical errors help ensure that valid business rules are being written. Such tools should be suitable for both technical and business users to use and should be integrated with the various editing interfaces provided. These tools

Figure 1. Capabilities for Managing Decision Logic



should ensure that the business rules being authored are at least potentially valid. They cannot tell if the business rules are the right ones for the business or if they handle every business scenario but they can tell if they are structurally and logically complete and that they handle known variations in data such as lists of values.

## Testing and Debugging

Testing and test management tools that support unit, system, and acceptance testing are a necessity. While there are circumstances in which business rules change so rapidly that formal testing is not part of the release cycle, most organizations will still have a set of tests they wish to run before allowing a new set of business rules to be deployed. Managing these tests should be straightforward. Business rules must sometimes be tested with other new components in the context of a broader application deployment and being able to test the business rules in this context is useful. Many products support integration with open test management standards such as xUnit.

Technical users, and ideally less technical ones, should also be able to debug business rules. They should be able to walk through the business rules executing in a decision to see what happens in specific cases. This may be supported only for a local test environment or for both local and production environments.

## Impact Analysis

Impact analysis and business simulation tools to allow non-technical users to see the impact of a set of rule changes on their business outcomes are an increasingly important part of managing decision logic. Business analysts and business users will not generally be willing to make changes to business rules unless they can see what impact a change will have. Similarly, when a change must be made to the business rules, due to a regulatory or policy change for instance, business users will want to see the likely impact of this change. The results must be presented in business terms to be useful—an increase in profitability, a reduction in fraud, etc.

These facilities may be provided as a batch tool for running historical or sample data through a set of business rules or as a more interactive tool allowing a business user to select the data they care about and running new or changed rules against that data. The best practice is clearly moving this closer to the editing of the rules themselves with the potential business impact of a change being shown automatically as a change is made in the editing tools.

## Data Management

Decision logic must be integrated with the data that will be available when the business rules are deployed. It needs to provide tools that at least allow technical users to integrate the business rules with the organization's data. In addition, it is useful for a product to be able to bring in large amounts of historical data as well as large test datasets to support effective testing and impact analysis.

## Deployment

A set of deployment tools that support the deployment of a set of business rules either as executable code or as a package that can be executed by a high-performance Business Rules Engine, ideally on multiple enterprise platforms, is required.

One point of confusion is the difference between a Business Rule Engine (BRE) and a Business Rules Management System (BRMS). A BRE can be part of a complete system for handling all the things involved in working with business rules. It is clearly an important part, but it deals only with execution. It determines which business rules need to be executed in what order. A BRMS is concerned with a lot more.

Business rules can be executed in several different ways once deployed. Some BRMSs support inferencing execution. Based on various algorithms, many derived from the original Rete algorithm<sup>1</sup> these determine the correct execution sequence based on the structure of the business rules and the data available when they must be evaluated. As business rules fire and change data, the engine reassesses which business rules might need to be fired next.

While there are some scenarios that are very difficult or even impossible to handle without inferencing support, they are not common. The key advantages of inferencing in normal use are that it allows the business rules to be written in any order and that it ensures business rules are re-evaluated when the data used in their conditions changes.

Business rules can also be executed in a sequential way, using the order specified for the business rules at design time. In many scenarios, especially when most business rules in a set will be executed for most transactions, this approach is faster. It also allows business rules to generate code, which can result in smaller and more portable deployments.

Finally, several products offer designed execution where the rules are executed sequentially but the order is determined by automated analysis of the business rules at deployment time. This simplifies execution but allows business rules to be written and edited in any order without any unexpected impacts on their behavior as the deployment time analysis will sequence the new and changed business rules appropriately.

For most business scenarios, all these approaches work well. Each approach has its own set of best practices in business rule writing.

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<sup>1</sup> The original algorithm is described in “On the efficient implementation of production systems” Charles Forgy’s Ph.D. Thesis, Carnegie-Mellon University, 1979. Extensive development and refinement has resulted in multiple, distinct versions of the algorithm.

## Repository

Last, but by no means least, products should offer an enterprise-class repository for storing and managing business rules. This repository may be a complete decision management repository that also stores predictive analytic models and optimization models. It is more likely to be one that only manages business rules. It should provide access control and security, audit trails for changes made to the business rules and versioning at several levels. An extensible repository that allows additional information to be added as well as an API for repository access can improve the integration of the product with other enterprise components. Some products provide integration with source code control systems, allowing business rules to be stored and managed alongside code used in the rest of the application.

## Next Steps

Embedding predictive analytics requires a software component for the creation, validation, management, deployment, and ongoing re-building of predictive analytic models. Such a Predictive Analytics Workbench allows a data miner, data scientist, analytics professional, or business analyst to explore historical data and use various mathematical techniques to identify and model potentially useful patterns in that data.

Continuing reading [The Decision Management Systems Platform Technologies Report](#)

## Learn More:

We have extensive experience helping organizations like yours define, configure and implement Decision Management Systems that deliver on the value propositions described in this Report. Our clients are leading companies in insurance, banking, manufacturing, telecommunications, travel and leisure, health management, and retail.

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## About The Decision Management Systems Platform Technologies Report

This report is focused on platform technologies used to build custom Decision Management Systems and our goal is to be comprehensive within this scope. Many vendors have developed powerful pre-configured Decision Management Systems focused on solving specific decision problems such as loan underwriting, claims handling or cross-channel marketing. For many organizations these solutions are ideal but they are not the focus of this report. Similarly, there are vendors that build custom Decision Management Systems for their customers and that have developed powerful platforms for doing so. If such a platform is not for sale to those building their own solutions, then it is out of scope for this report.

In both these scenarios the report's discussions of what kinds of functionality is useful, best practices and characteristics for suitable products may well be useful in the selection of vendors but some interpretation will be necessary.

Vendors and products in scope for the report are added continually. First Looks are also posted to [www.JTonEDM.com](http://www.JTonEDM.com) as they are completed. Each new version of the report will be made available at [decisionmanagementsolutions.com/decision-management-platform-technology/](http://decisionmanagementsolutions.com/decision-management-platform-technology/).

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### CONTACT US

Decision Management Solutions specializes in helping organizations build decision-centric, action-oriented systems and processes using decision management, business rules and advanced analytic technologies.

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