Automating Complex Processes with a Business Rules Engine
About the Author

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Dipti is a Consultant within the Transformation team at Tata Consultancy Services (TCS). She has over 14 years of experience in designing and implementing software products and solutions within the Banking and Insurance domains. Dipti has led multiple transformation projects and was involved in the transformation program for one of the largest insurance players in the APAC region. Currently, she focuses on identifying opportunities for adding value in BPS operations by conceptualizing contextual IT solutions.
A number of transactions in the Business Process Services (BPS) industry are dependent on manual decision-making. Due to this, transactions can be error prone and require highly skilled and experienced associates. Such processes become highly dependent on the relevant associates for completion. Associates therefore need a lot of training time, which entails a corresponding effort and cost.

There is an increased drive towards greater efficiency and accuracy in BPS operations, both of which are essential for greater end-customer satisfaction. Combined with increasing cost pressures, this makes automation in BPS essential. Automation driven by business rules reduces dependency on manual decision-making, and brings in consistency and accuracy in transactions.

This white paper describes how service providers can reduce dependency on individual associates by using a business rules based framework. It further explains how business rules driven processing can partially automate the decision-making required for BPS operations under various circumstances, and illustrates the same with relevant examples.
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Introduction

Operations in BPS can be broadly classified as voice, data entry, and knowledge processing operations. The operational cost incurred is lowest for data entry and highest for knowledge processing operations, largely due to the extensive training and re-training of associates required to develop specific intricate skills. Despite the higher operational cost, it is beneficial for a BPS provider to take on knowledge processing engagements, due to the higher margins involved.

Our analysis of the typical mode of working adopted by BPS associates across different types of operations presents some interesting findings as depicted in Table 1.¹ It shows typical activities an agent performs while gathering information for customer interaction, data processing, or analysis.

<table>
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<th>Activity</th>
<th>Customer Interaction Agent</th>
<th>Data Processing Agent</th>
<th>Knowledge and Analytics Worker</th>
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<td>Browsing</td>
<td>80%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Data Entry</td>
<td>10%</td>
<td>80%</td>
<td>50%</td>
</tr>
<tr>
<td>Structured Thinking</td>
<td>10%</td>
<td>10%</td>
<td>40%</td>
</tr>
</tbody>
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Table 1: Typical activities undertaken by BPS associates while searching for requisite information for transactions

Of the three activities depicted here, 'structured thinking' is highly dependent on the knowledge and experience of the BPS associates processing the transactions. It relies on a set of rules codified in the associates’ mind, usually as a result of an extended training cycle and experience. This leaves the decisions made vulnerable to errors.

To deliver consistent, efficient, and high quality services for business processes, it is necessary to minimize dependency on individual knowledge, and adopt processing based on pre-defined business rules instead. By devising and leveraging a business rules driven framework, providers can lower the cost of operations and training, while maintaining consistency, accuracy, and agility.

Looking at the Big Picture: The Importance of IT Solutions in Business Rules Driven Processing in BPS

Business rules are often not an integral part of IT applications—BPS associates need to work on them outside of IT applications. Often, business owners do not have adequate control over specifications and rules driving application behavior. Hence, the first step towards such automation is to develop and maintain a business rules engine (BRE). Effective use of a BRE can eliminate individual decision making by translating policies and procedures into a set of applicable business rules that can be triggered by an external (non-invasive) solution. Such a solution should:

- Ensure consistency and assist in structured decision making
- Allow business users to control system behavior by configuring business policies, thus enabling guided decision making
- Help increase accuracy and reduce operational risk
- Allow business users to configure business rules as required to enable faster roll out of changes
- Reduce dependency on associates' skillsets, enabling deployment of less experienced staff, lower training costs, and faster ramp-up, while ensuring consistency in assisted decision making

Easing the Implementation Process: Classifying Business Rules Driven Processing

Typically, the 'structured thinking' process can be semi-automated when it is linked to transaction processing driven by business rules. Such processing can be part of one of the following broad categories:

**Decision table based processing** – These are processes in which the action required for a transaction is dependent on a set of fixed conditions.

**Decision tree based processing** – In such processes, the action or result is dependent on a series of sequential steps. There are multiple options for each step depending on the response of the previous step.

**Judgment based processing** – This type of processing requires experience and judgment to ensure accuracy of transactions and to understand the specific characteristics of the transaction being processed.
Decision Table Based Processing

Maintaining an easy-to-understand decision table is one method of configuring a BRE. In decision table based processing, the deployed business rules need to be discrete, well-defined, and can be converted into a table of conditions and actions (decisions). This enables the business rules to be externalized from the application (source) code and managed by business users. In such a scenario, a rules engine can replace individual decision-making and make the execution of the process more accurate, agile, and efficient. This enables faster adoption of management decisions, market needs, or business strategy. In order for processes to be automated, an organization’s process delivery goals, policies, and procedures must be translated into a set of business rules that can be applied to individual events and interactions.

A couple of examples are given below to illustrate how decision table based processing can help BPS delivery teams.

**Scenario 1: Credit Card Application Acceptance**

The process for credit card application acceptance requires pre-processing and verification that entail intensive manual decision making to determine the required documents for processing. The documents that need to be collected and verified depend on factors such as channel of application, customer employment type, and application status (existing, new, payroll-listed, etc.)

This requires associates to make decisions and results in the card application going back and forth between the advisor and underwriter. It increases the potential for errors, delays processing, increases operational cost, and thereby increases customer dissatisfaction.

**Proposed Solution:** The business rules can be maintained in an easy to understand ‘decision table’. It can be a simple spreadsheet listing all the discrete sets of conditions to decide the type of documents required as shown in Figure 1. This can then be used to configure the rules engine of the application, based on which the system can prompt the advisor on the next set of steps for verification. This reduces dependency on manual decision-making.

![Figure 1: A Sample Decision Table for a Credit Card Application Acceptance Process](image-url)
Scenario 2: Imports Processing

When it comes to imports processing, BPS associates typically memorize processing rules from lengthy documents containing custom rules and regulations of a particular country, to decide upon the value of certain fields. This requires an extensive training cycle. These fields, which are linked to aspects such as cost, freight duty, value added tax (VAT), insurance, and processing fees, have multiple possible values depending on the different shipment parameters. Individual decision making in such cases can lead to errors and inaccuracies in processing, thereby inviting the possibility of penalties.

Proposed Solution: The rules need to be converted from verbose manuals to decision tables with conditions and resultant actions, along with the value of required fields for each possible parameter. This table can be used to configure the rules engine of the IT application. Associates processing the transactions can use the application to derive the resultant value rather than manually memorizing different conditions and associated field values. These rules can be maintained in a spreadsheet that is easy to use and modify, empowering business users to control changes in import processing policies and procedures.

Decision Tree Based Processing

Processing can be based on decision trees when business rules are discrete, well-defined, depicted by graphical flow charts, and possess multiple options at each stage instead of a fixed set of conditions.

Figure 2: A Typical Decision Tree for BPS Processing
Such an approach (as depicted in Figure 2) helps in making structured and consistent decisions across various business scenarios. It reduces complexity and ambiguity arising from a number of possible outputs or next steps at every stage. It also reduces the dependency on the personal experience of associates, and makes decisions consistently efficient and effective. One such example is given below to illustrate the use of decision trees in business processing.

Scenario 3: Credit Cards Chargeback Processing

Chargeback on credit cards is the process by which, following a dispute, a credit card issuing bank withdraws the money for a transaction from the merchant’s bank account and deposits the same into a consumer’s account. A cardholder can initiate a dispute by contacting the issuing bank and filing a substantiated complaint regarding one or more debit items on their credit card statement.

Credit card associations have comprehensive and elaborate guidelines for processing chargebacks. These rules and policies change frequently. Credit card disputes take a long time to resolve, so it is important that BPS associates take into account the date and applicable version of business rules when the dispute had been raised.

To arrive at the correct chargeback, BPS associates need to investigate and choose the correct chargeback reason, while selecting the right scenario from the huge number of possible scenarios as defined in the internal procedures and association guidelines. Interpreting the association guidelines is a complex, time-consuming, and error-prone task. The process is driven by tacit knowledge and associates often need a long training cycle to become conversant with the processing rules.

Proposed Solution: Using an IT solution for this process requires translating hundreds of complex scenarios into well-defined decision trees. These can be plugged into the application as a set of ‘related’ tables that are easy to understand and update. The application then processes each chargeback scenario as defined by the guideline documents to provide structured, consistent, and guided decision-making. The application can help associates arrive at the right reason code for the chargeback through a series of prompted and contextually close-ended questions. Each question is based on the response to the previous question. As this is an IT solution, a complete audit trail can also be easily maintained.

Judgment Based Processing

Judgment based processing requires BPS associates to derive decisions based on their experience and judgment. In many cases, BPS associates are faced with inputs that form a large number of unique data combinations; sometimes, even the format of the incoming data varies. This impacts the consistency, accuracy, and productivity of the process and becomes highly dependent on the judgment, skill, and experience of the associate.

Building a completely configurable and sustainable IT solution requires pre-processing, which is mandated at the point of process entry. The IT solution in such cases needs to empower end-users (the BPS associates) by giving them a configurable tool that can be leveraged to easily pre-process input data into a structured format. The BRE can then use pre-processed data to provide decision support and hence, reduce the dependency on the associate.
An example of such processing is provided below for managing huge variations in data for in-flight catering. In this case, multiple sources need to be referred to perform a single task.

Another example of judgmental processing are trade processes where banks are required to ensure that none of the parties (individuals or companies) involved in a transaction are ‘designated terrorists’ or have ‘sanctions’ imposed.

**Scenario 4: Management of Variations in Airline Catering Data**

Data for catering requirements received by in-flight services providers is dependent on the airline and aircraft type. The data is received in various file formats such Adobe PDF®, Microsoft Excel®, and Microsoft Word®. Within these formats, data gets represented in either tabular form or cart form for serving food and beverages. Within each file, each page can be different, and the length of the file can vary from about 20 pages for small aircrafts to about 50 for larger aircrafts. Considering an average page count of around 50, for say 60 airlines served by one in-flight service provider, with 100 flights per airline, the unique page count works out to around 300,000.

Processing such data necessitates extensive training for BPS agents, and providers need experts to enter it into an ERP system.

**Proposed Solution:** A standard format can be developed for use across all airlines. This can be further transformed into another ready-to-reconcile format to assist BPS associates in matching fresh airline specific input data against previously processed data residing in the ERP system. End-users can use the application to configure data depending on the airline, aircraft type, flight sector, and flight route. The application can then use the input document template and keywords to pre-process the data to an airline specific structured format.

**Scenario 5: Verification of Parties Involved in Trade Transactions in Banks**

Banks are required to ensure that the parties (individuals or companies) involved in a trade transaction are legitimate entities. To achieve this, BPS associates need to locate ‘proper nouns’ associated with the trade transaction from a large set of documents, which are typically in the form of scanned images. Associates are required to search each line in every page to make a list of proper nouns such as the beneficiary name, the shipping carrier, the insurance company, the port of loading goods, and the ports of transit. These are then checked against the names of places, organizations, and individuals that are illegal or considered potential threats.

In some instances, associates need to combine the various data to make a judgment regarding the parties involved. In such cases, the consistency, effectiveness, and efficiency of the decision making depend on the skills of the associates.

**Proposed Solution:** The extraction of proper nouns from document images can be automated with a combination of business rules driven information extraction techniques such as natural language processing (NLR) and name entity recognition (NER), as well as optical character recognition (OCR).

Based on a pre-configured list of dis-allowed entity names, a BRE based automated solution can help alert the user and prevent the approval of a transaction which involves parties that are part of a sanctioned list.
Choosing a Solution: Factors to Consider while Implementing Solutions Based on Business Rules

Any method chosen to implement a solution based on business rules needs to be cost-effective as well as user-friendly. The chosen solution must consider the complexity of transactions and decisions as well as the sources of incoming data.

One way to design the solution is to capture the required information and feed it into a standalone decision support system. The solution can also be integrated with various customer applications to acquire relevant inputs, and dynamically arrive at a system-based decision. The application can be designed in a way that BPS associates do not have to toggle between the customer input channels and service provider environments.

The solution may need to be agnostic to the location as well – whether in a customer data center or when owned by a single BPS provider. In a customer data center where the solution is potentially available to multiple BPS providers, complying with data security requirements becomes important. In such cases it also requires easy integration, scalability, and greater flexibility. However, when the solution lies in a BPS provider environment it has more restricted usage. In either case, the purpose and ease of use must dictate the solution design.

Conclusion

Partial automation of business rules driven processing in BPS can reduce the extent of manual decision making by associates and enable structured, IT driven, guided decision making. It minimizes dependency on the skill level and experience of BPS associates, and significantly reduces training requirements and their associated cost, effort, and time. Some processing scenarios in BPS require specific IT solutions crafted for the situation.

Organizations can tap into the significant opportunities for such automation in BPS within processes that require substantial 'thinking' on the part of associates, as well as in manual processing for well-defined discrete steps. Another indicator of the need for such solutions is when business rules are not an integral part of applications, and BPS associates have to apply them manually. Such automation is also essential in knowledge intensive processing that relies on a set of implicit rules or any process that requires extensive training and is highly dependent on the associates’ skills and experience.

Such a solution increases consistency, productivity, and accuracy, and significantly reduces risks associated with human decision-making. It also reduces complexity and ambiguity in the process used to arrive at decisions, leading to greater satisfaction for employees, business users and end-customers.
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TCS’ BPS unit has been positioned in the leaders’ quadrant for various service lines by many leading analyst firms. With over four decades of global experience and a delivery footprint spanning six continents, TCS is one of the largest BPS providers today.

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