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# The Five Categories of Operational Decisions

## White Paper: Business Rules and the Impact on Business Process Models

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# The Five Categories of Operational Decisions

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## Introduction

An update on Business Process Management with a Business Rules Approach.

A combination of business process modeling with a business rules approach and event processing can create comprehensive, agile solutions in many problem domains. Yet, it is not always easy to understand the role and interrelationships of these different visual modeling approaches. Indeed, prevalent process modeling approaches use an immediate parsing of requirements into process elements in combination with workflow patterns[1],[2]— likely in Business Process Modeling Notation (BPMN). There are alternate approaches to process modeling that start with business rules and Bosch software suite can support all of them. In this paper, we'd like to focus on the latter.

To begin, we should clearly define the differences among process, rules, and events. The term business process is used for a broad range of perspectives and motivations.

For our purposes, our definition - as motivated by executing or digitized processes, will be:

[1] BPMN Method and Style, 2nd Edition, with BPMN Implementer's Guide: A structured approach for business process modeling and implementation using BPMN 2.0, Bruce Silver, Cody-Cassidy Press (October 17, 2011)

[2] 'Introduction to BPMN', Stephen A. White, http://www.omg.org/bpmn/Documents/Introduction_to_BPMN.pdf

A business process is an organized, coordinated flow of activities conducted by participants, acting on and deciding on data, information, and knowledge to achieve a business goal[3].

The motivation of this definition is to create models with the intent of operationalizing or digitizing the business process. Other perspectives include organizational maturity and knowledge management. Also, different organizational levels can hold different views of a process.

When designing a digitized business process, business rules describe the facts and structure of compliance, operational controls and risk mitigation. When digitized in a business rules management system (BRMS), they are mediators of information in computer systems for decision-making process participants such as managers, employees, and salespeople. To put it more accurately and from the viewpoint of the business process:

"A business rule is a statement that defines or constrains some aspect of the business. It is intended to assert business structure or influence the behavior of the business."[4]

Like the business process, business rules exist in many forms, from natural text to fact models, and are used by a range of practitioners. Again, our perspective is the digitized process so our BRMS rules are expressed in executable, directed graphs and decision tables. When we design processes, we are defining the behavior of the business, so that processes comply with business rules by making operational decisions—a rules-compliant process. As we will describe later, not all rules are placed in a BRMS. Many simplistic, static or structural rules become elements of business processes. For instance, a rule that 'payment processing must occur after product delivery' is expressed as 2 activities and a sequence.

Operational decisions are frequently occurring, repeatable decisions that implement the compliance, operation and risk controls. They are settled with process data and evaluated by digitized business rules. So a business rule is an atomic logic step that uses data and knowledge to evaluate a part of a proposition about a process decision3.

In a BPM/Business Rules approach, processes are activated by business events. Chandy and Schulte[5] define a business event as:

"A business event is an event that is meaningful for conducting commercial, industrial, and governmental or trade activities."

With respect to process modeling, there are three categories of events:

1. Ordinary, trivial business process events, including activity transitions, message flows and anticipated errors and exceptions
2. Exceptional business process events, including system failures, process anomalies, unexpected and poor performance, important combinations of ordinary events, these can also arise from ERP and other systems
3. External complex or simple events, these include events that emerge from extramural processes such as customer orders and environmental or economic events.

We will consider the last two categories business events. As a metaphor of things external to ordinary internal process events (1), business events are an important aspect of process modeling. In addition to the events of ordinary orchestration, processes must respond and react to these 'business' events. Not only are events just detected and processed, but they can also affect 'in-flight' processes.

The differences between process, rules and business events are simple: rules are overarching, stateless directors of behavior while processes are stateful responders to the directives, and business events, are detected and processed. In BPMN, a process has an explicit or implicit single start, a flow of activities and one or more stops. In business rules, there is no flow of activities, just an expression of a sequence of logical conditions that directs, constrains or influences some aspect of the behavior of the business. In a decision graph, the sequence often is from top to bottom and from left to right. Events models consist of the universe 'outside the glass house' that is scanned for their existence and deciding, with rules, which processes will respond and how it will respond.

For almost a decade there have been various approaches to incorporate business rules into decisions and processes. By expressing rules as facts or assertions of facts, many business rules approaches at-

[3] The Microguide to Process Modeling in BPMN 2.0, Debevoise, Geneva and Welke, Advanced Component Research, 2010

[4] Business Rules Group, Defining Business Rules ~ What Are They Really?, www.businessrulesgroup.org

[5] K.Chandy, R. Schulte, Event Processing: Designing IT Systems for Agile Companies, McGraw-Hill Osborne Media, 2009

tempt to semantically describe the intended behavior of the business. This is isolated from computer code or process modeling[6], yet as defined here; digitized decisions cannot exist without digitized processes and vice versa. Indeed, the process should reflect the intent of the business manager—this is the essence of the business rules approach. More recently, business events and business event processing have become integral in the development of business process models. Again, business processes are triggered (assigned) or controlled (correlated and aggregated) by events.

A decision's outcome controls and directs pathways and other aspects of the process. Returning to Ron Ross's definition, the decision controls the behavior of the business and the behavior should be consistent with the compliance, operational and risk objectives. The rules' connections to complex event processing (CEP) is mentioned by almost every book on the topic (i.e.5 and[7]). Furthermore, the ways that organizations use decisions to govern processes is evolving. An effective design approach must recognize that process behavior considers external events as well as decision-generated events. A single decision can trigger and control multiple aspects of business processes including events, activities and data.

As shown in the diagram below, a common or naïve pattern for the outcome of calling a set of business rules is a control of a gateway diamond, or data-based gateway. Yet, as we will show, efficient, streamlined decision behavior can control more scenarios. Moreover, recent research supports this notion.

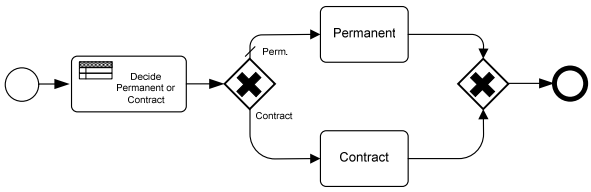


Figure 1: Simple business rules and gateway control of an execution path.

Many business analysts and process modelers are unaware of the capabilities of strong business rules models or worse yet, have outdated notions of the separation of process and rule logic. This is due to the simplistic or limited rules abilities of some process modeling tools and approaches. The result of these limitations is that too many things end up in the process model, on the business process diagram. Evidence of this is in the 'round the wall process'. In our experience, having a strong understanding and tooling in business process modeling will empower the business analysts to solve complex business challenges in the most agile manner available. Drawing from real-life examples, this white paper will describe the capabilities of a well-designed methodology and tools that support them.

# Five Categories of Operational Decisions

In addition to the abstract concepts of stateless, stateful, and detected, we know from recent research, business managers expect business rules to govern and control business operations with five concepts:

4. Rules should influence, order or sequence a process' tasks, decisions and internal events
5. Rules should influence and decide who is included in and assigned to a task
6. Rules should influence and decide what course of action is taken
7. Rules should influence and decide what data is retained, its validity, and duration and
8. Rules should detect, control, and respond to events

These five concepts are categories of operational decisions. We refer to dynamic decisions which are controlled by a BRMS. We will also describe static decisions, which are reflected in BPMN shapes, Static elements become elements of a business process map or diagram—transitions, activities and gateways. The challenge is to discern what should be delegated to a static element of a process model in BPMN and what can be delegated to the operational decision model. In other words, what should be categorized as dynamic decisions or static process elements?

Again, a 'dynamic' operational decision is discerned with business rules. For instance, a decision that looks at complex rules-driven conditions to decide the next activity is referred dynamic. A sequence arrow on a diagram is static.

As we have described, the operational decision is a nexus for governance and regulatory compliance objectives when these needs are dynamic. Further, combinations of the five concepts have a range of less obvious operational impacts. Business processes, operational decisions and business events are different aspects of the same thing: organizational objectives and goals.

The five concepts and the separation of rules and process logic suggest an efficient way to identify operational decisions and process details.

[6] Ron Ross, Business Rule Concepts, Business Rule Solutions Inc; 3rd edition, 2009

[7] David Luckham, The Power of Events: An Introduction to Complex Event Processing in Distributed Enterprise Systems, Addison-Wesley Professional,2002

In a process discovery effort there are five steps to this approach:

9. As the operational, compliance and risk management objectives are understood, the categories of the enforcing decisions suggest process elements and their course of action
10. The narrative of the modeling conversations will suggest what should be dynamic rules that make the decisions. Does the requirement have multiple logic steps, computations or conditions or is a static statement of facts?
11. The incoming data suggests the structure and organization of the rules that decide the operational decisions
12. The operational decisions proscribe downstream process components, activity order, responsible role, paths through the process, data and events
13. Static processes are reflected in the BPD, the dynamic or rules-driven elements are reflected in the BRE

With the Bosch software suite, model-driven approach to creating operational decisions, it is simple and efficient to optimize the outcome of dynamic decisions, as well as to coordinate related events. The modeling platform has pre-defined process patterns that can identify the placement of the operational decision. This can control many gateways and indeed other subprocesses within the process model. Finally, the inubit Suite supports all five categories of business process influence.

# Five Patterns

The diagram below depicts five abstract, iconic processes patterns for categories of dynamic or rules-driven patterns of operational decisions. These patterns are meant to highlight or illustrate the connection between the decision category and the responding process. They are not the only possible way to comply with the decisions directives. They are meant to suggest what can be affected with dynamic operational decisions.

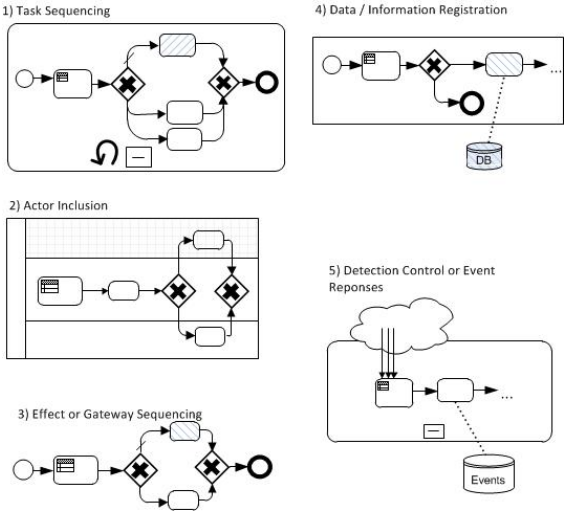


Figure 2: The five categories of operational decisions and their business process models affects.

Most operational decisions are a composite of these categories. For instance, a composite operational decision might affect both effect sequencing and actor inclusion.

### Process Task Sequencing

Sequencing decisions influence the position of one or multiple activities/events/decisions (hence process elements) within a business process. Most often, to create a rules-compliant process, process transitions are simply added, re-ordered or removed. That is, the existing activities in the process models are updated to reflect the new rules. If the nature of the sequence is static, for instance, payment processing always follows shipment receipt, then the rules are reflected in activity transitions or messages.

Operational decisions can dynamically control the sequence of activities, independent of transitions. There are many practical applications for this. Complex logic can trigger sequencing of activities that are situationally aware. Complex products, customized services for customers or manufacturing activities might need these abilities.

Figure 3 below shows a process fragment with an operational decision that explicitly decides the next phase of an application subprocess (‘Legal Review’, ‘Request Change’, or ‘Decline Request’).

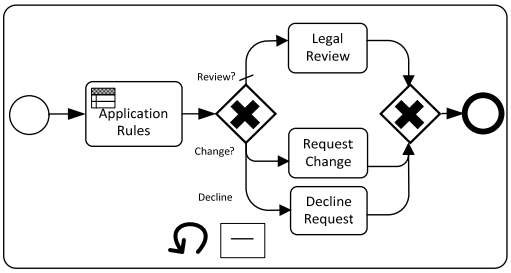


Figure 3: The operational decision within the loop selects the next task in a legal review to be executed.

There are other forms of dynamic process task assignments; however there are industry examples of this approach[8]. As with each of the examples of a process' response to operational decisions, the point of the pattern is to demonstrate the concept. More typical dynamic assignments might require extra steps such as a special inspection of a delivery, a notification, or a particular laboratory test in a receipting process.

Applications that need adaptive case management (ACM) must sequence their activities according to the needs of the process instance. Here, activity steps might be redone or skipped. The logic for the ACM can be placed in the operational decision. Another common use of this operational decision is within a nested checklist of completion items (punch list).

### Process Participant Assignment

Process assignment decisions influence the assignment of tasks to specific actors. There are several approaches to creating a complaint process. First, defined actors, in the form of participants, can be removed, added or appointed to elements inside process lanes.

With an operational decision, processes call business rules to dynamically delegate the activity to the correct actor to control what actor or participant performs an activity. Figure 4 depicts an operational decision that directs the outcome of a contract change request to a lane (role) in the process.

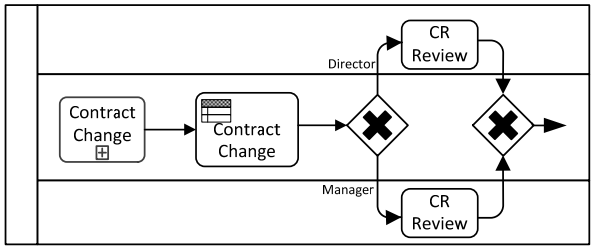


Figure 4: To illustrate business rule pattern 2, this controller process includes an operational decision assigning a process participant to a part of the process.

Beyond the limited security of the lane's role, operational decisions can discern the details of an activity and locate the correct person or group to conduct a task. In industrial or engineering services, personnel often must be certified to perform a task and that certification can be time-limited. Other common uses for this type of operational decision include purchasing authority at different monetary values. Other uses might involve types of legal reviews or oversights.

### Effect Sequencing

Effect sequencing is the classic integration of the outcome of an operational decision with a business process's gateway. An example is shown in figure 5.

Most business processes contain multiple decision points. Processes can decide things like what risks are assigned to activities, what therapies apply to a medical customer, or which mode of communication is used. For these operational decisions, effect sequencing evaluates the process instance data. If you change the business rules, you will change the processes' behavior.

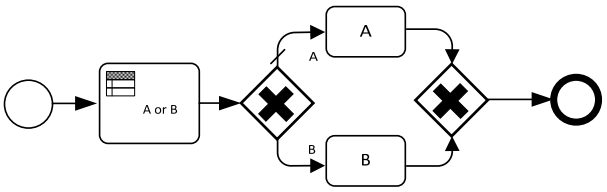


Figure 5: For operational decision category 3, the sequence or path of the process is controlled by the business rules.

### Data Information

As shown in Figure 6, operational decisions can dynamically influence the recording and viewing of data and information, the validity of the data, and the authorization to access it. Most often, to create a compliant process, internal controls govern how long recorded data is kept, the condition and state of complete or registered data and who gets to see the data. Registered data must contain information with form and integrity and authorizations, restricting access to predefined user and roles.

Dynamic operational decisions are excellent for validating the data and verifying the age and condition of the data.

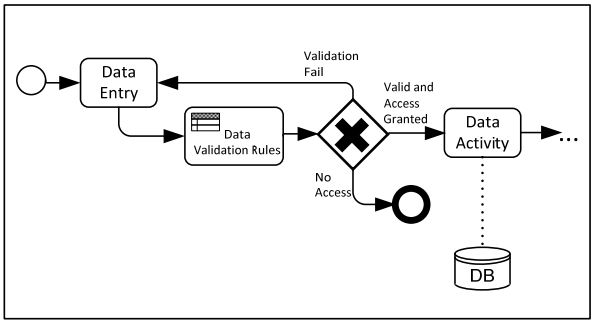


Figure 6: For operational decision category 4, the access to and validity of the process data is controlled by the decision.

### Detection Control or Event Reponses

As shown in Figure 7, the final and arguably most important operational decision is event detection and

[8] Bernd Rücker, http://www.bpm-guide.de/2012/11/02/bpmn-unstructured-processes-and-acm-example-patent-application/

control. Detection decisions apply the rules that influence how and what processes respond to business events. As defined earlier, business events can be external or internal. External business events might include customer or trading partner events. External events might also include more indefinite topics like weather, commodity, or security events. Internal business events arise from process activities or the audited results of an activity.

Most often, when dealing with ordinary events, to create a compliant process multiple layers of processing can be used: activities can be added, reordered or removed. This also applies, when the process responds to a 'business event channel' in a dynamic way.

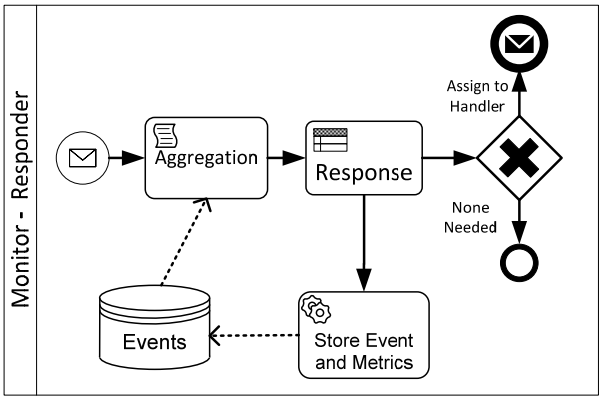


Figure 7: For detection decision, rules determine if the message delivered by the device is 'actionable' and should be assigned to an event handler.

Figure 7 considers the case when devices are posting status events to a monitoring service. Here, broadcast events from devices are actively monitored. The aggregation script is run to match the monitor message with what exists in events data source. The response rule set determines the action to take, such as assigning processes and participants that should directly receive the event. The current state (moving average, status, standard deviation, etc) is updated as a service task.

Operational detection decisions are used in numerous different situations:

- As a step in an event processing channel, perhaps an incoming stream of messages must be properly responded to and processed
- As a step in processing a specific external event, such as monitoring weather risk services or commodity prices from a services such as plats
- As a step in a composite operational decision

As we will see in the detailed use case below, executing operational decisions can uncover important business events that must be handled. For now, consider these examples:

- Service employees need equipment to perform their tasks. When deciding what equipment to issue to an employee, an operational decision might consider the quantity needed and create a reorder business event.
- When servicing equipment, an operational decision assembles needed actions and discovers that a critical component is being replaced too frequently and triggers an investigation business event.
- When locating personnel to perform a task, an operational decision discovers that a person's training for an important capability has lapsed and triggers a training scheduling business event.

–

Operational decisions rarely affect only one of the five categories. Frequently, in deciding a proposition concerning a process, limits are reached, funds are exhausted, and opportunities are identified.

### Operational Decisions for a Process-centric Approach

One focus of business process and business rules design tools is to empower business analysts or subject matter experts to create and control the specifications for the process outcomes. A business friendly approach should permit business analysts to:

- Communicate in a straightforward, non-technical way
- Specify behavior and outcomes in a comfortable environment
- Define, test, and simulate business scenarios

Part of the answer is a simple, intuitive, and graphical environment. Another part is providing support for the 5 categories of operational decisions. Graphical models can be built for all aspects of a decision's outcome, including the downstream process response.

Conceptually, a business process is constructed of activities, events and gateways. The five operational decisions define the ways businesses use process elements to govern the behavior and outcome. We have already described how the categories affect BPMN flows. In a BPM/Business Rules approach, the logic of the operational decision is described by business rules and the outcome, or proscribed response, can detail most of the process. A process-centric approach considers rules in a more limited fashion. There are other approaches, including the event-based approaches of complex-event processing. Here, we focus on operational decisions in a process-oriented approach.

### Exploring an Operational Decision Use Case

Process governance and control is the objective of the operational decision; compliant behavior is affected by the decision. To explain what we mean by this, we will use an Onboarding example. Onboarding is the process of acquiring, accommodating, assimilating and accelerating new team members, whether they come from outside or inside the organization. In this operational decision example, we will look at an apparently

simple activity of assigning a computer to an employee.

Bosch's Visual Rules simply and rapidly controls all the aspects of the operational decision's behavior. In particular, Visual Rules can simultaneously assign the correct data attributes and create events around the equipment assignment. With Visual Rules' intuitive business rules modeling environment, business analysts can decide, compute and assign values to output data. They can also invoke process activities by invoking 'actions,' such as reordering products when a minimum inventory level is reached. The actions become process directives in the form of conditions on gateways. With Execution Server, decisions can be published as a web service and seamlessly integrated with processes.

Consider the following use case:

- The onboarding process submits a request for a computer assignment to the human resources department. The rules for the type of equipment are dependent on the department and the position. Laborers do not receive computers. Other employees receive a computer, but only one of the correct type. If a computer is available to be successfully assigned to the employee, a request is sent to the IT department to provision the computer. The computer is then configured with the appropriate software and hardware features. If there is no computer of the type that is needed, the manager and IT department are notified. If the inventory should be refreshed, (there is only one unassigned computer remaining) then the IT department is notified.

Using this use case, we can state the operational decisions requirement's business rules in the style of Ron Ross:

```
1.0.1 Eligible employees should be as-
signed a computer.

1.0.2 Laborers are not eligible for a com-
puter.

1.0.3 The type of computer must be deter-
mined by the department and position
she/he works for.

1.0.4 The employee may only be issued one
computer of the correct type.

1.0.5 Orders for new computers are esca-
lated or reordered when only one is left.

1.0.6 The manager will be notified when no
computers are available.

1.0.7 The equipment manager will provision
the computer according to the needs of the
position.

1.0.8 The inventory manager orders comput-
ers when inventory is low or under a thre-
shold value (as per 1.0.8)
```

If these rules are combined into a single operational decision, it will be a composite of the three of the five categories:

- It is a process participant assignment decision because it defines the responsibility of the activities (equipment manager, and others)
- It is an effect sequencing decision because it defines the path of the process, based on the state of the inventory
- It is an event detection decision because it defines events such as when new equipment must be ordered.
- Implicitly it is a data decision because it implies that computing inventory must be available.

## Diagramming Operational Decisions in Visual Rules

There is a rational approach to parsing written decision requirements – the words of the business rules- such as the ones shown above, into graphical Flow Rules. To understand this, we revisit our business rules definition,—it is 'a constraint on the behavior of a business'. A constraint is a test of a condition that is either true or not and most business rules are a composite of several constraints. The outcome of the rule can either be used to test more business rules or they assign values that direct the process in the manner of the '5-categories'. Typical rules constraints might include:

- Eligible Applicant
- Preferred Customer
- Direct Delivery Contract

Others terms of a constraint might build on these terms:

- Within the contract's period of performance
- More than three accidents
- Acceptable levels of defects

For example, these terms can constrain who gets an insurance policy or an order for products. So, to create a digitized or implemented constraint, the concepts of the rule must be reduced to data and its derivation and meaning. That means there is either a Boolean place holder (variable) that is directly evaluated to the constraint, or there are a combination of data that can be evaluated to the desired constraint. Data for operational business rules can come from user input, a process instance or enterprise data such as databases and operational data stores.

Within the rule's constraint, three basic or unit operations occur:

- Categorize: The type, sort, color, flavor or division of the object is decided.
- Calculate: Formulas of data are applied, statistics are developed. Values are determined
- Comparisons: we compare the calculation to redline, threshold value or boundary conditions that are reached to decide the truth of the constraint. Comparisons might also be made between the categorization and sets of categories.

The constraints of decisions are developed through these operations. We have already mentioned categories of objects, in the list starting with eligible applicants. Other categories might include overdrawn accounts, damaged shipments and failed lab tests. Computations involve a metric, such as a count, measure or date that characterizes a constraint.

These operations lead to another key definition, the decision node:

A decision node is the part of a business decision that evaluates the constraint of a business rule. The evaluation is completed through a categorization of the object, or by computations that are compared with threshold or redline values. The outcome of the decision is an effect or influence of the process.

The key to 'drawing' the written requirements is to, first, identify the nodes and the requirements for categorization, computations and comparisons that support their evaluation. Next , we assemble a logical sequence of these nodes.

The decision nodes in Visual Rules are shown with gold diamonds:

Figure 8: A Decision Node in Visual Rules.

With this background, we can now return to the translation of a written statement into Visual Rules flow rules.

These nodes are not always in the first clause of a sentence— as is an "If ... then..." form. Early in the diagramming process, a logical model, devoid of technical details, can be developed. As categorizations and computations are developed, technical details, including queries and accesses to data emerge. The physical model is developed this way—keeping track of the data and computational need of the nodes. A logical analysis of the computer assignment requirement shows the following:

Eligible employees should be assigned a computer

- Node: Eligible Employees, category Eligible Employee, outcome: continue assign computer decision

Laborers are not eligible for a computer.

- Node: Laborers are ineligible for computer, category laborer employee, outcome: no computer

We simply reverse these two nodes to develop the first two requirements:

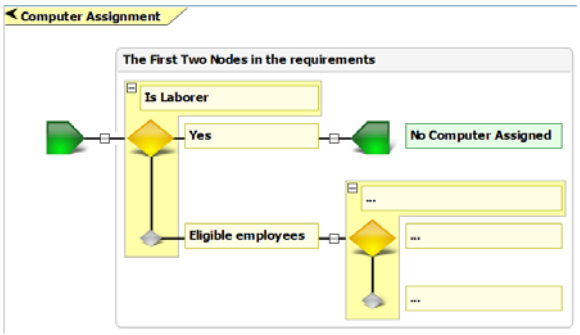


Figure 9: The first two sentences in Visual Rules.

We introduced the exit in this fragment. This notation causes execution to stop and return.

Figure 10: The Done and Return element in Visual Rules.

Next, we consider the sentence: The type of computer must be determined by the department and position she/he works for.

It is safe to assume that the company has more than one department or position, so there should be one node for each department and position pair. The requirement did not specify the range of values for the departments and positions. In addition, if these nodes repeat themselves then a decision table is probably warranted.

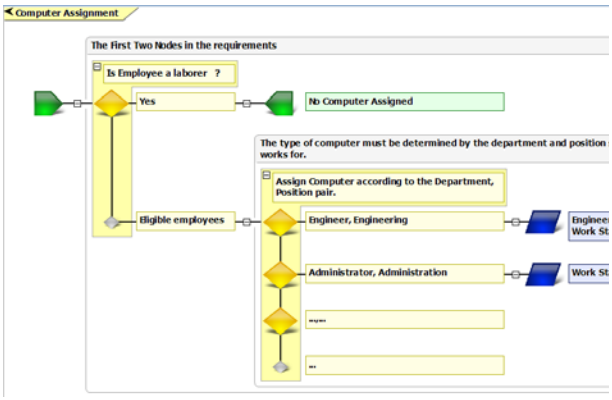


Figure 11: Adding the type of computer assigned.

Nodes have outcome, either additional nodes to evaluate or data to read and write. In this diagram, we have introduced the Assign Flow rule element, which executes an expression:

Figure 12: The Assign element in Visual Rules.

In this case, we are showing the assignment of the computer type in the flow rule.

Next, the sentence: The employee may only be issued one computer of the correct type, shows a reverse of the logic. The reverse stops if an employee has equipment.

We can restate this as: If the employee is already issued a computer, then do not issue the computer. This is the first node requiring a computation: the number of computers issued to the employee.

- Node: employee already issued a computer, computation: count of computers of this type issued to employee, comparison count > 0
- Calling Process Impact: not yet defined.

Figure 14 shows this logic. To be complete at this point, we might want to create an event, in order to notify the process when computers are already issued.

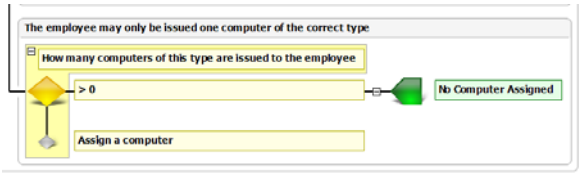


Figure 13: Deciding what to do if computer already assigned

Next the sentence: Orders for new computers are escalated or reordered when only one is left.

- Node: Order new equipment, computation: number of computers left, comparison, less than 2.
- Calling Process Impact: to notify the inventory manager when new computers must be ordered.

Next in the requirements, we note that the manager needs to be notified when no computers are issued. Since we have already computed the number of computers left, we use this node to decide if the event, no computer issued, has been identified. Also, as shown in the figure below, this is modeled as a continuation of the previous node.

- Node: Same as Order new equipment.
- Calling Process Impact: to notify the personnel manager no computer is issued.

Finally, the requirements state that the equipment manager will provision the computer according to the needs of the position. Just like the other two requirements, these are a conditional branch of the same decision node.

- Node: Same as Order new equipment.
- Calling Process Impact: to notify the equipment manager to provision the computer. It also tells what equipment to issue.

In the last three business rules requirements, all share the same node— the number of computers remaining. In Visual Rules, the notation that depicts multiple hits from the same node is indicated by the text "* multiple matches" and the vertical ellipsis or dots on the diamond. The three final requirements are shown in the next figure.

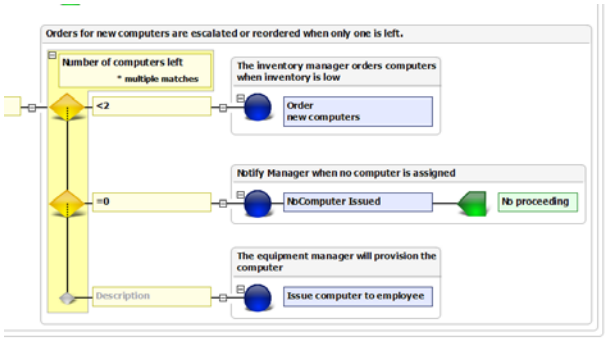


Figure 14: Adding the type of computer assigned.

In this diagram we have introduced the notation for an action – the outcome of evaluating a decision node. This will signal the process that an event was identified by the operational decision.

Figure 15: The Action notation in Visual Rules; this indicates that the calling process should respond in the appropriate manner.

As we will see, these Actions will be returned to the process and the process will act upon them as events.

**Completing the Operational Decision**

This analysis provides an initial or logical depiction of the requirements. The data must be obtained and the computations performed. This potentially means access to database and services. It is also a design choice: should the process handle the data or is it done by the rules. Some say that it is best to keep the interfaces on process level for easy maintenance and orchestration on one level whereas others talk about the benefits when logic and access is encapsulated in a rule model. There are notations and design methods for these which we will briefly cover. In addition, transactions might need to be setup within the operational decision to assure data consistency. In the last part of our use case, the computer should be provisioned and assigned to the employee. One way to assure data consistency would be to set data attributes in the database that associate the equipment with the employee.

Arguably, the business rules supporting the decision use case could be broken into smaller fragments within a process flow. Yet it seems apparent that all of these activities are different views of the same operational decision: how to assign a computer to an employee. Best practices for this style of designing the rules are related to the frequency of the reuse of the smaller components within the different processes. The BRMS is the source of the reuse.

It is interesting to note how the operational decisions, in this instance, create the need for process activities. Deciding on the number and content of the operational decision is a choice of the designer. We have decided that our operational decisions should hold all the logic that correctly assigns the correct computer to an employee. A successful outcome is this single assignment. If it is not successful, then several events will be detected that cause other activities to occur. Within assigning a computer to an employee, the business rules that create events are:

1.0.5, 1.0.8: Order More Equipment

1.0.6: Notify Manager, No Computers

1.0.7: Provision and Issue the Computer

These events are not explicitly called out by the process model; they are the outcome of the decisions. It is clear that these outcomes influence aspects of the business process. In an event-oriented or CEP approach, the design of the application might have different characteristics.

# Executable Operational Decisions in Visual Rules

To finally assign a computer to an employee, Visual Rules needs to: determine what type of computer should be assigned; and then assign it to the employee by updating the employee record in the database. In performing this action, the data are assigned values that are then returned to the process. As we have mentioned, the consequence of these actions might be to provision the employee's computer or to order more equipment.

As mentioned earlier, determining a computer type based on the position and department suggests a decision table. This decision table, referenced in the Flow Rule in Figure 16, is shown below:

**Computer Types, as assigned by department and position**

| Department | Position | Unit | Computer Type |
|---|---|---|---|
| Human Resources | Administrative | Any | Work Station |
| | Manager | Any | Lap Top |
| Engineering | Engineer | Any | Engineering Work Station |
| | Manager | Any | Engineering Lap Top |
| | Administrative | Any | Work Station |
| Service | Field Rep | Installer | PDA |
| | | Servicer | Lap Top |
| | Manager | Any | Engineering Lap Top |
| Sales | Manager | Any | Work Station |
| | Engineer | Any | Engineering Lap Top |
| | Sales Person | Any | Etchasketch |

Figure 16: A Decision Table that assigns a Type of Computer according to the Department, Position and Unit.

We described some of the ways that the rules design affected the process design. Another aspect is the technical requirements that are created from the categorize-compute-compare-analysis. In identifying the rule's decision node, the technical requirement emerges. Examine the following table.

In many cases, the computation of the operand for the decision node is accomplished by the query of a database. Once a computer type has been determined, we can look in the database to see if a computer of the type needed is available. So our earlier logical prototype should be detailed with the database queries. The Flow Rule fragment below the table shows a portion of this.

| Rule | Category | Computation | Threshold |
|---|---|---|---|
| 1.0.01, 1.0.2 Eligible Employee Rules | Eligible, non-laborer | | |
| 1.0.3 Computer Type Rules | Employee Division, Position | | |
| 1.0.4 One Computer/Employee Rule | | Number of Computers already issued | 0 |
| 1.0.5 Escalate Reorder computers Rule | | Number of type remaining | 1 |
| 1.0.6 Notify Manager when none issued Rule | | Number of type remaining | 0 |
| 1.0.7 Provision Computer Rule | | Number of type remaining | >0 |
| 1.0.8 Inventory Manager Rule | | Number of type remaining | <2 |

Figure 17: Categorize-compute-compare-analysis.

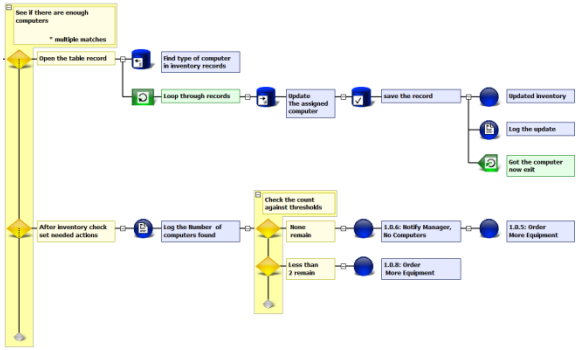

Figure 18: An executable fragment of a Flow Rule that assigns a specific computer and set actions according to the business rules.

In the Flow Rule fragment shown in Figure 18 above, we see that we have moved the Actions (the blue spheres) that trigger events in the process:

1.0.8 (and 1.0.5): Order More Equipment

1.0.6: Notify Manager, No Computers

Next, the process example will reflect this.

**Process Example**

To demonstrate the features of the business process as controlled by this use case, we will use a process created by the inubit Suite. Figure 19 presents the computer assignment process example in the inubit Workbench. The decision call to the Visual Rules Execution Server is shown at the top of the business process diagram (BPD), in the Human Resources pool, as the business rules activity "Computer Assignment Decisions".

Because ordering equipment and provisioning the computers can take place in parallel, a data-based inclusive gateway (the diamond with a circle in the center) is used.

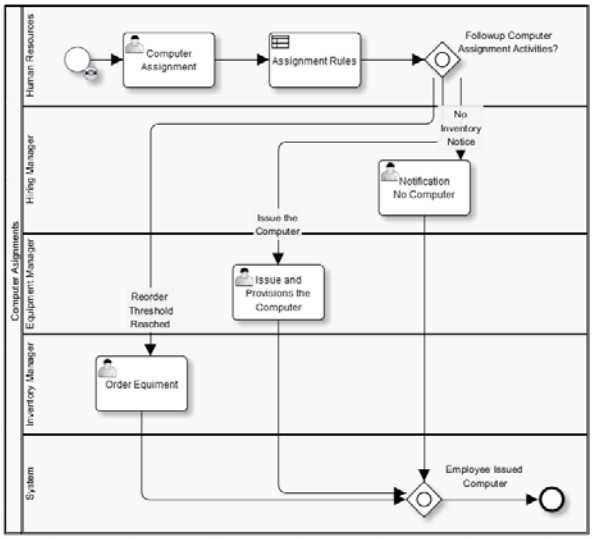


Figure 19: A process example in inubit process workbench that uses Visual Rules to assign computers to an employee according to the business rules derived from the use case.

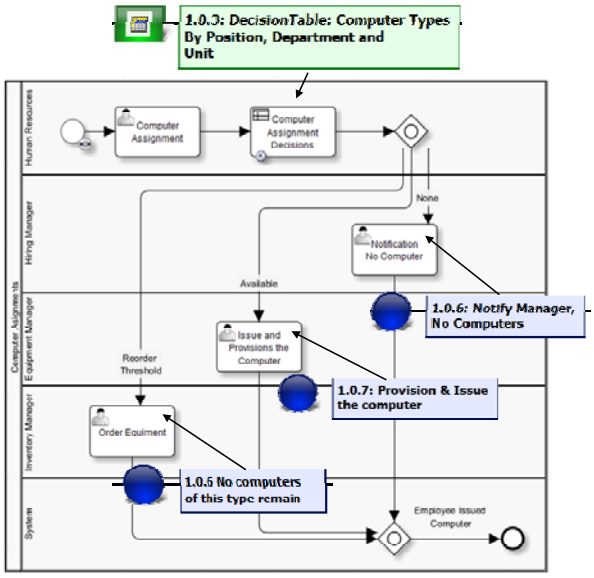


Figure 20: The connection between the decisions of the business and the business process. It shows that, in addition to data created and assigned in Visual Rules, Actions can invoke activities in the process.

# Conclusions

As we have clearly demonstrated in this paper, processes, decisions and events achieve different aspects of the same thing: processes that are compliant with the operational, compliance and risk management objectives. We have argued that the details of compliance, as carried out by an operational decision include these elements:

14. The sequence of a process's activities and events
15. Who is included in and assigned to a task
16. What course of action is taken
17. What data is retained, its validity, and duration and
18. How to detect, control, and respond to events

Thus, an effective design must recognize that process behavior considers decision-generated events. From a single operational decision, events and data can trigger and control many aspects of business processes.

We described five different ways that a decision's outcome can direct the pathways of the process. In the onboarding example we modeled a use case that:

- Identified actors that needed to complete tasks, including the equipment manager and the inventory manager.

- Identified the tasks that needed to be completed, including the provisioning of computers and the ordering of equipment.
- Identified the sequence of activities, as in the timely ordering of equipment.
-

As a nexus for governance, risk and regulatory compliance, the process decision is both an important management concept and a strategic design tool for achieving business objectives and goals.

The Bosch software suite provides a powerful design environment that simplifies management control of business processes. In the absence of an understanding, operational decisions are not separated from the business processes. This creates a weak model, because operational decisions change more frequently than the process. The result of separating processes from rules stabilizes business processes and permits operational decisions to change without having to change the process application. Understanding the five operational decision categories simplifies the choice of what should be dynamic operational decisions supported by business rules and what should be a static part of the process. We presented approaches for deciding what should be an operational decision (business rule) and what should be on the BPMN process diagram (gateways and conditions).

Both business processes and operational decisions are important intellectual assets that need to be documented, managed and shared. This can be achieved across the enterprise using repositories and software tools.

Here are the key components of the approach:

- Business Processes and Operational Decisions must be model-driven, visual languages that discover and document the process
- Teams need tools that analyze, model and test the impact of changes to Business Processes and Operational Decisions changes across the enterprise
- Organizations seek to trace Operational Decisions to policy and organization objectives

In summary, from the perspective of governance, risk and compliance, the five categories define an outline of the process.

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# Author

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