Decision-aware Business Processes

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**Decision-aware Business Processes**

- A decision-aware business process as one that is designed to distinguish between
  - tasks that perform work (i.e., process tasks) and
  - tasks that come to conclusions based on decision logic (decision tasks)

- Decision logic should be externalized from decision tasks and represented in a different kind of model
  - Process tasks are procedural
  - Decision logic should be declarative

- Separating business decisions from business process tasks
  - simplifies the business process model,
  - allows to manage business logic in a declarative form,
  - delivers the business logic in a form that transcends technology options

*(von Halle & Goldberg 2010, p. 66)*
Managing Decision-aware Business Processes

The general approach for dealing with knowledge work in business processes can be specialized to a procedure model for decision-aware business processes:

1. Process Elicitation
2. Decision Analysis: Identify key questions
3. Modelling
   ♦ Process Flow
   ♦ Decision Logic
4. Continuous Improvement
   ♦ Business Process Management
   ♦ Business Decision Management
Distinguishing a Procedural Task from a Declarative Decision

- A procedural solution specifies how, in a step-by-step manner, something is to be done.
  - So a business process model is a procedural solution because it prescribes a set of tasks that are carried out in a particular sequence.
  - The business process model is the “How” of a unit of work.

- A declarative solution only specifies what needs to be done, with no details as to how, in a step-by-step manner, it is to be carried out, because sequence is irrelevant to arriving at the correct result.
  - A Decision Model is a declarative solution because it is a set of unordered business logic, not a set of ordered tasks.
  - A Decision Model is the “What” of a special kind of unit of work.

(von Halle & Goldberg 2010, p. 67)
Procedural versus Declarative

A procedural solution specifies how, in a step by step manner, something is to be done.

A declarative solution is what needs to be done, with no details as to the methods to be used (no sequential information).

Business process is a procedural solution of tasks to be performed in precise sequential order. The “How” of a unit of work.

A declarative solution occurs when sequence is irrelevant to the result. The “What” of a unit of work.

(von Halle & Goldberg 2010, p. 67)
Example 1: Declarative vs. Procedural Solutions

Option 1

Start → Person Employment History → Good → Person Debt → Low → Set Person Credit Rating to A → End

Bad → High → Set Person Credit Rating to A

Option 2

Start → Person Debt → Low → Person Employment History → Good → Set Person Credit Rating to A → End

High → Bad → Set Person Credit Rating to A

Option 3

Start → Determine Person Credit Rating → End

Process Model

(von Halle & Goldberg 2010, p. 69)

Rule Family Table

<table>
<thead>
<tr>
<th>Rule Pattern</th>
<th>Person Debt</th>
<th>Person Employment History</th>
<th>Conclusion</th>
<th>Person Credit Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Good</td>
<td>=</td>
<td>“A”</td>
</tr>
<tr>
<td>1</td>
<td>Low</td>
<td>Bad</td>
<td>=</td>
<td>?</td>
</tr>
<tr>
<td>1</td>
<td>High</td>
<td>Good</td>
<td>=</td>
<td>?</td>
</tr>
<tr>
<td>1</td>
<td>High</td>
<td>Bad</td>
<td>=</td>
<td>?</td>
</tr>
</tbody>
</table>

Decision Model Diagram

Procedural

Declarative
Advantages of Separating Business Processes and Business Logic in Option 3

- The Rule Family implies no particular sequence among the conditions to be tested.

- The Rule Family can contain as many rows as are needed to reach the correct conclusion. It can contain additional columns if other conditions are needed to determine a person’s credit rating.

- The Decision model also contains business logic for the logic not modeled in the business process models of Option 1 and Option 2, e.g.
  - the adjudication of the credit rating for all values of person’s debt and employment history other than “low” and “good” (indicated with a "?" in the model).
  - the rules for determining what low/high debt and good/bad employment history mean

- To change or add conditions in a business process model is much more cumbersome than doing so in a Rule Family table.

(von Halle & Goldberg 2010, p. 68f)
## Distinctions between Business Process and Business Decision

<table>
<thead>
<tr>
<th>Business Process</th>
<th>Business Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Procedural in nature</td>
<td>• Declarative in nature</td>
</tr>
<tr>
<td>• Consists of tasks connected by sequence</td>
<td>• Consists of Rule Families connected by inferential relationships (all independent of sequence)</td>
</tr>
<tr>
<td>• Is all about how (step-by-step sequence to carry out work)</td>
<td>• Is all about what is to be concluded (the logic leading from conditions to conclusion)</td>
</tr>
<tr>
<td>• Improvements in business process aim for increased work efficiency</td>
<td>• Improvements in a business decision aim for smarter business logic</td>
</tr>
<tr>
<td>• Represented best in a procedural business process model</td>
<td>• Represented best in a declarative Decision Model</td>
</tr>
</tbody>
</table>

(von Halle & Goldberg 2010, p.70)
Improvements by separating business logic from Business Process Model

- Allows a much simpler business process model
- Easily highlights all possible combinations of conditions
- Supports the principle of separation of concerns
  - Permits changes in the Decision Model without changing the business process model
  - Permits changes in the business process model without changing the Decision Model

(von Halle & Goldberg 2010, p. 69)
Disadvantages to Burying Decisions (Business Logic) in Business Processes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forces unnecessary sequence and constraints on business logic</td>
</tr>
<tr>
<td>2</td>
<td>Makes changes to business process and business logic difficult</td>
</tr>
<tr>
<td>3</td>
<td>Adds meaningless complexity to business logic and business process</td>
</tr>
<tr>
<td>4</td>
<td>Fails to deliver a visual representation of all business logic</td>
</tr>
<tr>
<td>5</td>
<td>Makes governance of business process and business logic difficult to manage</td>
</tr>
<tr>
<td>6</td>
<td>Results in business logic and business processes that are not reusable</td>
</tr>
<tr>
<td>7</td>
<td>Compromises SOA</td>
</tr>
</tbody>
</table>

- If a business process is too complicated, a reason might be that business rules are embedded in the flow.

- "If you separate the business rules, you can develop remarkably stable business processes" (Roger Burlton) (von Halle & Goldberg 2010, p. 70)
Example 2: Business Logic contained in a Process Model

How many main decisions?

Option 1

(von Halle & Goldberg 2010, p. 71)
Managing Business Logic separately

This solution has two tasks with their Decision Models.

The Decision Model can be viewed, managed, and executed as one whole set of business logic, as a black box evaluating conditions and reaching a conclusion.

Business Logic can be reused
- the whole decision model
- Individual rule families

(von Halle & Goldberg 2010, p. 71f)
A Business Process Model does not Reveal All Business Logic

- If the separation of business processes and business logic is not made consciously, some business logic might be in the process model while others is missing.
- It must then be modeled separately, e.g. in the task descriptions or externally (if it is represented at all).
- Reusability if hampered: Some of the business logic may be used in several of the tasks (maybe even in several processes).
- The Decision Model resurrects all of the business logic in one visual artifact.

(von Halle & Goldberg 2010, p. 72)
Business Process Model, Decision Model and Rules Families

(von Halle & Goldberg 2010, p. 76)
Integrating the Decision Model with BPMN

- Execution of a decision described by a Decision Model is a particular type of task in BPMN.
- In BPMN 2.0 the corresponding task type is called a business rule task.
- In the figure below, Validate Order is the decision task. Its logic is described by the Decision Model. The gateway simply tests the output of the decision and routes the flow either to A or B based on the result.

(Von Halle & Goldberg 2010, p. 425)
Decision Requiring Sequence

- There are business circumstances that require separate business decisions and Decision Models.
  - Different business decision may be governed by different groups, hence having separate Decision Models facilitates separate governing bodies for the business logic.
  - There may be different decisions depending on a previous decision (Example: After a make-or-buy decision either the supplier has to be selected or the effort for the development is derived).

(von Halle & Goldberg 2010, p. 77)
Achieving Business Excellence by Managing Decision Logic Separately

- von Halle and Goldberg argue that operational excellence alone is insufficient for sustainable competitive advantage.

- Key business process must not only be efficient and consumer-friendly but also smart and agile
  - Business processes become agile when declarative business decisions are separated from procedural business process tasks
  - Business processes become smart when the business decisions are governed appropriately by business leaders

- When the business leadership clearly understands the business logic behind the business decisions, the impact of those decisions can be ascertained, and the business can quickly and easily make adjustments. (von Halle & Goldberg 2010, p. 78)
Literatur

Which types of knowledge work according to (Davenport 2010) are suitable to be modeled as decision-aware processes?