The Decision Model:
A Presentation for Business Analysts

Barbara von Halle
Managing Partner, Knowledge Partners International, LLC
BvonHalle@kpiusa.com
In the News

• Software: KPI and eDev to offer automated approach to Decision Modeling and Requirements Definition: InteGREAT requirements suite.

• Workshop: Using Business Decision Management to Revolutionize Business Requirements and Processes

September 15 DC, Nov 1 NYC:
KPI (approach)
Freddie Mac (practitioner)
eDevTech (software)
Learning Objectives:

• Separate and model business logic (rules) as the missing piece in requirements
• Recognize that business logic (rules) has its own structure and integrity different from other modeled assets.
• Create a Decision Model following a step-by-step agile and iterative approach
• Integrate The Decision Model and Visualization with Requirements
About KPI: Thought Leader

• The Decision Model
• STEP Methodology and Training for Business Decision Management
  Business Process Management
  Business Requirements
  Business Logic Testing
• Leading provider of methodology and consulting to Global 1000 companies since 1997

“...one of the classic books of a new era in computing that will have much traction in the next few years” Dr. Opher Etzion, Master Inventor, IBM

Copyright © KPI 2010
Agenda

• The Problem of Business Rules (Logic)
• Introduction To The Decision Model
• Building a Decision Model Step-by-Step
• Decisions versus Process
• The Decision Model, Visualization in Requirements
• Summary
Separation of Concerns: The One Dimension Left Behind

Traditional Application Architecture – A “Big Ball of Mud” (Foote & Yoder)

Component Based Application Architecture

Source: Ken Orr

Copyright © KPI 2010
How Business Rules (Logic) are Handled Today
What History Teaches Us

<table>
<thead>
<tr>
<th>The Relational Model</th>
<th>The Decision Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Changes the way we manage, leverage, store data</td>
<td>– Changes the way we manage, leverage, store business logic</td>
</tr>
<tr>
<td>– Recognizes that data has its own existence</td>
<td>– Recognizes that business logic has its own existence</td>
</tr>
<tr>
<td>– Elevates data as an organizational asset</td>
<td>– Elevates business decisions (logic) as an organizational</td>
</tr>
<tr>
<td>– Introduces rigor through normalization principles</td>
<td>asset</td>
</tr>
<tr>
<td>– Impacts technology, methodology, and best practices</td>
<td>– Introduces rigor through normalization principles</td>
</tr>
<tr>
<td></td>
<td>– Impacts technology, methodology, and best practices</td>
</tr>
</tbody>
</table>
How The Decision Model Changes Everything
Agenda

• The Problem of Business Rules (Logic)
• **Introduction To The Decision Model**
• Building a Decision Model Step-by-Step
• Decisions versus Process
• The Decision Model, Visualization in Requirements
• Summary
Definition of Business Logic

Business Logic is the means by which the business derives conclusions from facts.

The simplest case is the evaluation of a single fact, leading to a single conclusion:

One example of such a statement:

A person has a poor employment history \rightarrow A person is highly likely to default on a loan

Copyright © 2010 KPI
What is an Atomic Piece of Business Logic?

• An atomic piece of business logic
  – Consists of zero to many conditions
  – Leading to a conclusion about one fact type
  – Each condition is an atomic logical expression
  – About an atomic fact type
  – Conditions are ANDed together, never ORed
### What Does Atomic Business Logic Look Like?

Below is a schematic of a Single Atomic Statement of Business Logic:

<table>
<thead>
<tr>
<th>Fact Type</th>
<th>Operator</th>
<th>Operand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Employment History</td>
<td>Is</td>
<td>Poor</td>
</tr>
<tr>
<td>Person Mortgage Situation</td>
<td>Is</td>
<td>Poor</td>
</tr>
<tr>
<td>Person Misc Loan Assessment</td>
<td>Is High</td>
<td></td>
</tr>
</tbody>
</table>

**Multiple Atomic Conditions Connected by “AND”**

<table>
<thead>
<tr>
<th>Fact Type</th>
<th>Operator</th>
<th>Operand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Likelihood of Defaulting on a Loan</td>
<td>Is High</td>
<td></td>
</tr>
</tbody>
</table>

**Single Atomic Conclusion**

Copyright © 2010 KPI
The Rule Family –
A Way to Represent
Multiple Logic Statements

Instead of Multiple Logic Statements that Look Like This:

<table>
<thead>
<tr>
<th>Person Employment History</th>
<th>Is Poor</th>
<th>Person Mortgage Situation</th>
<th>Is Poor</th>
<th>Person Miscellaneous Loans Assessment</th>
<th>Is High</th>
<th>Person Likelihood of Defaulting on a Loan</th>
<th>Is High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is</td>
<td>Poor</td>
<td>Is</td>
<td>Poor</td>
<td>Is</td>
<td>High</td>
<td>Is</td>
<td>High</td>
</tr>
<tr>
<td>Is</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td>Is Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is</td>
<td>Poor</td>
<td>Is</td>
<td>Poor</td>
<td>Is</td>
<td>Low</td>
<td>Is</td>
<td>Medium</td>
</tr>
</tbody>
</table>

They May be Represented in Two Dimensional Tables called Rule Families:

Rule Families are Tables that Conform to Rigorous Principles
Building Further: Where Do We Get Our Input?

<table>
<thead>
<tr>
<th>Rule Pattern</th>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person Employment History</td>
<td>Person Outside Credit Rating Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>1</td>
<td>is Poor</td>
<td>is High</td>
</tr>
</tbody>
</table>

- Starting with the first condition, we ask where this Fact value comes from. Input from a web page or a file? Is it Persistent data? Is it the result of execution logic?
- In this case we discover that it comes from executing logic that evaluates other business criteria: the business experts want to judge a Person’s Employment History based on criteria such as Person’s Years at Current Employer and Person’s Number of Jobs in the Past Five Years.
- We have to build an additional Rule Family where the conclusion will be “Person Employment History”, a different conclusion to that of our current Rule Family (Rule Family: Business logic grouped by Conclusion.)
Building Up to Two Rule Families

• Note the Interim Conclusion “Person Employment History”
• We discover the need for yet another Rule Family. This one comes to a conclusion about a Person’s Employment History which is based on two conditions: Person Years at Current Employer and Person Number of Jobs in Past Five Years.

<table>
<thead>
<tr>
<th>Rule Pattern</th>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Years at Current Employer</td>
<td>Person Number of Jobs in Past Five Years</td>
<td>Person Employment History</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rule Pattern</th>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Employment History</td>
<td>Person Mortgage Situation</td>
<td>Person Miscellaneous Loans Assessment</td>
</tr>
<tr>
<td>1</td>
<td>is Poor</td>
<td>Is Poor</td>
</tr>
</tbody>
</table>
Three Rule Families  (How do we connect them?)

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule Pattern</td>
<td>Person Student Loans</td>
</tr>
<tr>
<td>Person Employment History</td>
<td>Person Years at Current Employer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule Pattern</td>
<td>Person Employment History</td>
</tr>
<tr>
<td>Person Employment History</td>
<td>Person Mortgage Situation</td>
</tr>
<tr>
<td>1</td>
<td>is</td>
</tr>
</tbody>
</table>

The fact types in bold are “dynamic data” so what does this mean?
Agenda

• The Problem of Business Rules (Logic)
• Introduction To The Decision Model
• **Building a Decision Model Step-by-Step**
• Decisions versus Process
• The Decision Model, Visualization in Requirements
• Summary
Every Decision Model Starts with a Business Decision

“Business decision: a conclusion that a business arrives at through business logic and which the business is interested in managing.”

<table>
<thead>
<tr>
<th>Fact Type</th>
<th>Business Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claim Payment Amount</td>
<td>Estimate the claim payment amount</td>
</tr>
<tr>
<td>Claim Payment Eligibility</td>
<td>Determine Claim Payment Eligibility</td>
</tr>
<tr>
<td>Customer Likelihood of Loan Default</td>
<td>Determine Customer Likelihood of Loan Default</td>
</tr>
<tr>
<td>Insurance Policy Renewal Method</td>
<td>Determine insurance policy renewal method</td>
</tr>
<tr>
<td>Inventory Item Minimum Stock Level</td>
<td>Assess the Inventory Item minimum stock level</td>
</tr>
<tr>
<td>Loan Prequalification</td>
<td>Determine loan prequalification requirements for a customer</td>
</tr>
<tr>
<td>Person BMI (Body Mass Index)</td>
<td>Calculate Person BMI</td>
</tr>
<tr>
<td>Vendor Performance Index</td>
<td>Calculate the Vendor Performance Index</td>
</tr>
</tbody>
</table>

The underlined words (Calculate, Estimate, Determine, Assess, Validate) are “Decision Words”
The Decision Shape denotes the Decision and is named with a Decision word: e.g. Determine, Calculate.
Decision Model Notation

The Rule Family directly connected to the business decision shape is called the “Decision Rule Family.”

All labels below the Rule Family name denote condition column headings.

The Name of a Rule Family is the conclusion column heading.

Determine Policy Renewal Method

Policy Renewal Method
Policy Tier Within Bounds
Policy Renewal Override

Copyright © KPI 2010
Determine Policy Renewal Decision Model

The solid line terminated by the dot connects Rule Families that have an inferential relationship. In this case, the condition column “Policy Renewal Override” in the Decision Rule Family has an inferential relationship with the conclusion column of the “Manual Renewal Override” Rule Family.

Policy Tier Within Bounds
- Policy Discount
- Policy Tier

The labels below the solid line but above the dotted line denote condition columns that do not serve as conclusion columns in another Rule Family. These condition columns will be populated by known fact values (e.g. persistent data).

Policy Renewal Method
Policy Tier Within Bounds
Policy Renewal Override

The labels below the solid line but above the dotted line denote condition column headings that serve as a conclusion column heading in another Rule Family.
### Decision Model Notation

This diagram shows graphically how the Rule Family shapes depict the Rule Families themselves in an

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Policy Tier</th>
<th>Policy Discount</th>
<th>Policy Tier Within Bounds</th>
<th>Policy Renewal Override</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≤ 1</td>
<td>&gt; 10%</td>
<td>Is</td>
<td>Yes</td>
<td>Manual Renewal Process</td>
</tr>
<tr>
<td>2</td>
<td>≤ 1.5</td>
<td>&gt; 20%</td>
<td>Is</td>
<td>No</td>
<td>Manual Renewal Process</td>
</tr>
<tr>
<td>2</td>
<td>≤ 2</td>
<td>&gt; 22%</td>
<td>Is</td>
<td>No</td>
<td>Manual Renewal Process</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 1</td>
<td>≤ 0%</td>
<td>Is</td>
<td>Yes</td>
<td>Automatic Renewal Process</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 1.5</td>
<td>≤ 20%</td>
<td>Is</td>
<td>Yes</td>
<td>Automatic Renewal Process</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 2</td>
<td>≤ 22</td>
<td>Is</td>
<td>Yes</td>
<td>Automatic Renewal Process</td>
</tr>
<tr>
<td>1</td>
<td>&gt; 2.6</td>
<td>Is</td>
<td>Yes</td>
<td></td>
<td>Automatic Renewal Process</td>
</tr>
</tbody>
</table>
The Decision Model is seen to be complete when there are no further dependent fact types for which supporting Rule Families have not been drawn. Can you identify persistent versus dynamic data?
Decision Model Principles

• Structural Principles – Structural simplicity
• Declarative Principles – Declarative structure
• Integrity Principles – Optimal logical integrity

These Principles ensure that each row, each pattern and each family has business and logical integrity: this means that the business purpose has been understood and aligned, and that there is no logical error in the logic, and that there is no conflict or duplication in the logic. The Principles introduce Normalization.
Agenda

• The Problem of Business Rules (Logic)
• Introduction To The Decision Model
• Building a Decision Model Step-by-Step
• Decisions versus Process
• The Decision Model, Visualization in Requirements
• Summary
Option 1: Distinguishing Decisions from Process

Option 2

Option 3

Process Model

Rule Family Table

Decision Model Diagram
Simplify the Models, Improve the Solution

Before

After
Agenda

• The Problem of Business Rules (Logic)
• Introduction To The Decision Model
• Building a Decision Model Step-by-Step
• Decisions versus Process
• The Decision Model, Visualization in Requirements
• Summary
FirstSTEP

• Step1: Scope
• Step2: Selection and First Iteration of Models
• Step3: Visualization
• Step4: Iterate the Models (Until Complete)
• Step5: Finalize the Requirements
**FirstSTEP Scope**

- Review the Project Charter
- Use the framework to create scope:

<table>
<thead>
<tr>
<th>Scope Contexts</th>
<th>What</th>
<th>How</th>
<th>Where</th>
<th>Who</th>
<th>When</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inventory Identification</td>
<td>Process Identification</td>
<td>Network Identification</td>
<td>Organization Identification</td>
<td>Timing Identification</td>
<td>Motivation Identification</td>
</tr>
<tr>
<td></td>
<td>Inventory Types</td>
<td>Process Types</td>
<td>Network Types</td>
<td>Organization Types</td>
<td>Timing Types</td>
<td>Motivation Types</td>
</tr>
</tbody>
</table>

**STRATEGISTS as THEORISTS**

- List of Things Important to the Business
- List of Processes that the Business Performs
- List of Locations in which the Business Operates
- List of Organizations important to the Business
- List of Events/Cycles Significant to the Business
- List of Business Goals/Strategies

**DECISIONS! SWOT Analysis**
# FirstSTEP Models

## Scope Contexts

<table>
<thead>
<tr>
<th>What</th>
<th>How</th>
<th>Where</th>
<th>Who</th>
<th>When</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory Identification</td>
<td>Process Identification</td>
<td>Network Identification</td>
<td>Organization Identification</td>
<td>Timing Identification</td>
<td>Motivation Identification</td>
</tr>
<tr>
<td>Inventory Types</td>
<td>Process Types</td>
<td>Network Types</td>
<td>Organization Types</td>
<td>Timing Types</td>
<td>Motivation Types</td>
</tr>
</tbody>
</table>

## Business Concepts

<table>
<thead>
<tr>
<th>What</th>
<th>How</th>
<th>Where</th>
<th>Who</th>
<th>When</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory Definition</td>
<td>Process Definition</td>
<td>Network Definition</td>
<td>Organization Definition</td>
<td>Timing Definition</td>
<td>Motivation Definition</td>
</tr>
<tr>
<td>Business Entity</td>
<td>Business Transform</td>
<td>Business Location</td>
<td>Business Role</td>
<td>Business Cycle</td>
<td>Business End</td>
</tr>
</tbody>
</table>

## Conceptual Data Model
- Business Process Model
- Fact Type Model
- Glossary
- Business Use Cases
- Prototypes

## Business Process Model
- Network Diagrams
- Logistic System
- Governance Model
- Master Schedule

## Business Motivation Model
The Decision Model

**Visualization**
Application Visualization

• Business analysts, product managers & UE professionals assemble simulations of possible solutions
• Business and IT stakeholders “test drive” & provide feedback in rapid, interactive explorations
• Discussions are more focused & engaging
• Visualization dramatically improves communication between business & IT
Problems Solved using Visualizations

- Improve User Adoption
- Cut Requirements Cycle Time
- Eliminate Rework
- Drive Innovation
- Reduce Outsourcing Risk
- Collaborate with the Business
The Decision Model has produced requirements faster, incrementally, and with unprecedented agility.

**Vocabulary Models:**
- Glossary/Semantic Model
- Logical Data Model
- Object Model

**Business Motivation Model**
- Influencer
- Assessment
- End
- Means

**Use Cases**

**Organization Model**
- Enterprise
- Business Unit
- Function

**Decision Model:**
- Business rules and business logic

**Process Model**

**SOA Components**

**Business Requirements & Test Cases**

Copyright © KPI 2010
Agenda

• The Problem of Business Rules (Logic)
• Introduction To The Decision Model
• Building a Decision Model Step-by-Step
• Decisions versus Process
• The Decision Model, Visualization in Requirements
• Summary
Real World

• “The Decision Model’s principles and normalization rules give us confidence we can get repeatability and consistency amongst business analysts when performing rules analysis.
• In addition, the structural integrity of the Decision Model makes the technology implementation straightforward
• IT and Operations have agreed to use our decision model as business requirements for business logic changes – this will greatly speed up the change process
• In addition, the use of a COTS BRMS solution will allow us to take advantage of additional capabilities over time, such as enhanced testing and decision-warehousing capabilities.”

Mark Pettit, Freddie Mac, Operations Management Group, MITIQIS, July 15, 2010
The Future is Here

• Requirements and Modeling Support
  – eDev
  – RuleGuide
  – More?

• Automation Support
  – BRMS
  – Open Rules

• Standards
  – OMG DMN Group
Learning Objectives:

• Separate and model business logic (rules) as the missing piece in requirements
• Recognize that business logic (rules) has its own structure and integrity different from other modeled assets.
• Create a Decision Model following a step-by-step agile and iterative approach
• Integrate The Decision Model and Visualization with Requirements
How to Learn More

• Log in to the KPI Website to:
  – Review the White Paper on requirements, a free download on the web site
  – Review The Decision Model Primer, a free download on the web site
  – Check Events for upcoming public training
  – Conduct a 2-3 week pilot (KPISTEP)

www.KPIUSA.com