Introducing The Decision Model: A Business Logic Framework

Larry Goldberg, Managing Partner

January, 2012
Timeline

Barbara von Halle early tester of DB2 and interfaced often with Dr. Codd
Larry Goldberg builds technology based companies on three continents

Founding of Knowledge Partners Inc. Consulting Company focusing on Business Rules

Barbara and Larry Co-edit Business Rule Revolution

Barbara and Larry write The Decision Model

Enterprise-grade Software Application Developed by Sapiens


Barbara co-authors Handbook of Relational Database Design

Barbara Authors Business Rules Applied

Good Methods Global is incorporated as a sister company of KPI

Barbara and Larry found Knowledge Partners International LLC
Who is KPI?

Thought Leader

- The Decision Model
- Business Logic Framework linking Business with Technology

- Business Process Management
- Business Decision Management
- Business Rule Management
- Enterprise Architecture
- Business Analysis
- Requirements
- Testing

Experience

- Financial Services
- Insurance
- Healthcare
- Government
- Utilities
- Transportation
- Telecommunication
- Supply Chain
- Energy

Services

- FirstSTEP
  Service to create unambiguous, and complete Requirements

- KPISTEP
  Service to perceive, organize and manage Business Processes and Rules with Decision Models

- STEPment
  Mentoring of clients to achieve self-reliance with Center of Excellence

  Training & Certification

Publications

© 2012 Knowledge Partners International LLC • www.kpiusa.com • www.thedecisionmodel.com
Agenda

• **Current State: Business Rules**
  • The Decision Model Bottom Up
  • The Decision Model Top Down
  • Impact on Business Analysis
  • Architecting Decision Management
  • Data Quality and The Decision Model
• Case Studies
• The Ways We Can Help
• How to Learn More
“Big Ball of Mud”
Foote & Yoder

Software Systems
Separation of Concerns
Component Based Application Architecture
Ken Orr

What happens to business logic today?

Business Logic

Business rules
All Too Familiar?
Is this Acceptable?

Business Logic

Business Process Model
Does this look better?

Business Process Model
Where did the business rules go?

Decision Model

Rule Family

Rule Family Table

Atomic Logic Statement

A person has a poor employment history

A person is highly likely to default on a loan
Agenda

• Current State: Business Rules
• **The Decision Model Bottom Up**
  • The Decision Model Top Down
  • Impact on Business Analysis
  • Architecting Decision Management
  • Data Quality and The Decision Model
• Case Studies
• The Ways We Can Help
• How to Learn More
Definition of Business Logic

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

The simplest case is the evaluation of a single condition, leading to a single conclusion.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person credit rating is less than 650</td>
<td>Person likelihood of defaulting on a loan is high</td>
</tr>
</tbody>
</table>
What is an Atomic Piece of Business Logic?

• One and only one conclusion fact type, such as:
  – Person likelihood of defaulting on a loan
  – Claim’s eligibility for payment
  – Student’s eligibility for financial aid packages

• As many conditions as needed, even zero

• All conditions ANDed together

• No Ors, ELSES, BUTs, OTHERWISEs (these have created the chaos in current systems!)
The Rule Family is a Two Dimensional Table

Multiple Logic Statements that Look Like This:

Become Two Dimensional Tables called Rule Families Like This:

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Credit Score &lt; 650</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>AND Person Employment History Is Unstable</td>
<td>Is High</td>
</tr>
<tr>
<td>AND Person Other Loans Amount Is High</td>
<td>Is High</td>
</tr>
<tr>
<td>Is less than 650</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is Unstable</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is High</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is greater than 720</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is Unstable</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is Low</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is less than 720</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is Unstable</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is Low</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is Medium</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
</tbody>
</table>

Rule Families are Tables that Conform to Rigorous Principles
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

We start by discovering the conclusion in the sentence or paragraph
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
</table>

We see that the conclusion is “A person is highly likely to default on a loan”


“*A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.*”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Likelihood of Defaulting on a Loan</td>
<td>is</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
</tbody>
</table>

We recast the conclusion into a conclusion fact type: Person Likelihood of Defaulting on a Loan, and we assign it a value of “High”
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td></td>
<td>is High</td>
</tr>
</tbody>
</table>

Next we look for conditions that cause us to reach that conclusion
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Likelihood of Defaulting on a Loan</td>
<td>is High</td>
</tr>
</tbody>
</table>

We see that a “person who has a credit score below 650” is one of the conditions that lead to the conclusion.
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Credit Score</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is less than 650</td>
<td>is High</td>
</tr>
</tbody>
</table>

We recast “Person Credit Score” into a fact type, and we assign an operator “is less than” and value “650” to it in this row.
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Credit Score</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Is less than 650</td>
<td>is High</td>
</tr>
</tbody>
</table>

We identify the next condition leading to the conclusion
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Credit Score</td>
<td>Person Employment History</td>
</tr>
<tr>
<td>Is less than 650</td>
<td>Unstable</td>
</tr>
<tr>
<td></td>
<td>is</td>
</tr>
<tr>
<td></td>
<td>is High</td>
</tr>
</tbody>
</table>

We recast Person Mortgage Situation into a fact type, add a new column for this new header, and we assign the value “Poor” to this row.
Simple Rule Family

“A person who has a credit score below 650, an unstable employment history and a high Other loans assessment is highly likely to default on a loan.”

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Credit Score</td>
<td>Person Employment History</td>
</tr>
<tr>
<td>Is less than 650</td>
<td>is Unstable</td>
</tr>
</tbody>
</table>

We identify a “high Other loans assessment” as the third condition leading to the conclusion
Where Do We Get the Condition Values?

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Credit Score</td>
<td>Person Likelihood of Defaulting on a Loan</td>
</tr>
<tr>
<td>Person Employment History</td>
<td></td>
</tr>
<tr>
<td>Person Other Loans Amount</td>
<td></td>
</tr>
</tbody>
</table>

| Is less than | 650 | Is | Unstable | Is | High | is | High |

- Starting with the first condition, we ask where its values come from: a web page or a file? Is it raw, stored data? Is it the result of execution logic?
- Person Credit Score comes from an outside service, simply raw data.
- The value for Person Employment History is an internal judgment or decision. It comes from evaluating other conditions, such as:
  - Person Years at Current Employer
  - Person Number of Jobs in the Past Five Years.
- What to do?
Two Rule Families

- We create another Rule Family, this one with conclusion column for Person Employment History
- This conclusion is known as an Interim Conclusion because it need not be stored, it is a conclusion-in-flight (during execution)
- This Rule Family comes to a conclusion about a Person Employment History based on two conditions: Person Years at Current Employer and Person Number of Jobs in Past Five Years.
- These two Rule Families are naturally linked together with an “inferential relationship”

<table>
<thead>
<tr>
<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>
</tr>
<tr>
<td>Is less than 500</td>
<td>Is Unstable</td>
</tr>
</tbody>
</table>
Decision Model Principles

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

These Principles ensure that:

• The Decision Model is aligned with its business purpose
• There are no errors in its logic
• It can execute in any technology (current and future)

The Principles introduce Normalization.
Agenda

• Current State: Business Rules
• The Decision Model Bottom Up
• The Decision Model Top Down
• Impact on Business Analysis
• Architecting Decision Management
• Data Quality and The Decision Model
• Case Studies
• The Ways We Can Help
• How to Learn More
Every Decision Model Starts with a Business Decision

“**Business decision**: a conclusion a business arrives at through business logic which is worth 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”
Determine Policy Renewal Method

Decision Model Notation
Decision Model Notation

Determine Policy Renewal Method

Policy Renewal Method
Policy Pricing Within Bounds
Policy Underwriting Risk
Manual Underwriting Indicator
Policy Pricing Within Bounds
   Policy Discount
   Policy Tier

Policy Renewal Method
Policy Pricing Within Bounds
Policy Underwriting Risk
Manual Underwriting Indicator

Determine Policy Renewal Method
## Policy Pricing Within Bounds

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Policy Tier</th>
<th>Policy Discount</th>
<th>Policy Pricing Within Bounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≤ 1</td>
<td></td>
<td>Is No</td>
</tr>
<tr>
<td>2</td>
<td>≤ 1.5</td>
<td>&gt; 10%</td>
<td>Is No</td>
</tr>
<tr>
<td>2</td>
<td>≤ 1.5</td>
<td>&gt; 20%</td>
<td>Is No</td>
</tr>
<tr>
<td>2</td>
<td>≤ 1.5</td>
<td>&gt; 22%</td>
<td>Is No</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 1</td>
<td>≤ 0%</td>
<td>Is Yes</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 1.5</td>
<td>≤ 20%</td>
<td>Is Yes</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 2</td>
<td>≤ 22</td>
<td>Is Yes</td>
</tr>
<tr>
<td>1</td>
<td>&gt; 2.6</td>
<td></td>
<td>Is Yes</td>
</tr>
</tbody>
</table>

## Policy Renewal Method

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Policy Pricing Within Bounds</th>
<th>Manual Underwriting Indicator</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is Nonstandard</td>
<td></td>
<td>Is Manual Renewal Process</td>
</tr>
<tr>
<td>2</td>
<td>Is No</td>
<td></td>
<td>Is Manual Renewal Process</td>
</tr>
<tr>
<td>3</td>
<td>Is On</td>
<td></td>
<td>Is Manual Renewal Process</td>
</tr>
<tr>
<td>4</td>
<td>Is Standard</td>
<td>Is Yes</td>
<td>Is Automatic Renewal Process</td>
</tr>
</tbody>
</table>

---

When is it Finished?
How Big Are They?

Determine Policy Renewal Method

Policy Renewal Method
Policy Pricing Within Bounds
Policy Underwriting Risk
Manual Underwriting Indicator

Policy Pricing Within Bounds
Policy Discount
Policy Tier

Policy Discount
Policy Grade
Package Grade
Package Discount
Location State Category

Policy Underwriting Risk
Insured Major Ownership Change
Insured Major Location Change
Policy Annual Premium
Policy Discontinued Agent

Insured Major Ownership Change
Insured Minority Stockholder
Insured Majority Stockholder
Insured Board Change
Insured CEO Change

Insured Major Location Change
Insured Location Zip-5
Insured Location Occupied Square Footage
Insured Location Construction

© 2011 Knowledge Partners International LLC • www.kpiusa.com • www.thedecisionmodel.com
A decision is identified having to do with whether an insurance policy should be reviewed by the system or only manually by an underwriter.

Whiteboard activity begins. A decision icon is created. The decision name begins with “Determine” and followed by a conclusion fact type denoted as a candidate fact type. A candidate fact type is a fact type that does not yet exist in the glossary as it is awaiting approval.

The decision icon is connected to the Decision Rule Family which, at this time, only contains the conclusion fact type name above the solid line, again as a candidate fact type.
SMEs identify ideas for conditions that should lead to the candidate conclusion. These ideas are listed in whiteboard form because they are not yet fact types. The SME requests that the decision be based on the pricing performance of the policy, which she wants to derive by comparing the Policy Discount (a candidate fact type, because it does not yet exist) to the Policy Tier (a persistent, hence already approved, fact type) representing the original pricing tier for the policy.

These are shown between the solid line and dotted line (even though Policy Tier is a persistent fact type) because more investigation is needed to confirm that these fact types make sense.
The SME also requests that, in addition to Policy Pricing Performance, underwriting risk be evaluated. In particular, if the risk factors are too high then the policy ought to be manually underwritten by an underwriter. This idea is recorded as a white board idea called “Underwriting Risk” because it isn’t yet considered a fact type, just a notion.
A dependent Rule Family is established to represent the Policy Discount vs. Policy Tier white board idea. A name for this Rule Family is still to be resolved. A dependent condition fact type, Policy Discount, is established to calculate a new way of discounting compared to current pricing. We discover that Policy Tier is a fact type whose value is available as persistent data, so it is placed below the dotted line and turned to blue. The SME intends to compare the Policy Tier to new Policy Discount to determine if the policy can be automatically renewed without re-pricing.
The dependent Rule Family is given a candidate fact type name, and this becomes the conclusion fact type name. The interim fact type in the Decision Family must also change to complete the inferential relationship.
In order to decide whether the logic is correct, a Rule Family table is created for Policy Pricing Within Bounds. The Rule Family appears to satisfy the SME, and the process of creating the Decision Model moves forward.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Policy Tier</th>
<th>Policy Discount</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 2.6</td>
<td>&gt; 22%</td>
<td>Is</td>
<td>No</td>
</tr>
<tr>
<td>&gt; 1</td>
<td>≤ 0%</td>
<td>Is</td>
<td>Yes</td>
</tr>
</tbody>
</table>
A supporting Rule Family is established to calculate the new Policy Discount. It is given a candidate conclusion fact type. SMEs identify the fact types to determine the value of Policy Discount. Since they are all persistent data, the Policy Discount Rule Family is complete, pending the approval of the fact type names, definitions, and domains. The Policy Pricing Within Bounds Rule Family is also complete.
The SME now considers the logic to determine the impact of underwriting risk on automated renewal. The SME identifies the notion of major change in risk related to the Insured as being an important condition of this rule family. The SME also decides to determine an absolute level of premium above which there must be a manual underwriter renewal. Both these notions are given whiteboard representation.
Developing a Skeletal Decision Model – 9

Legend:
- White = candidate fact types
- Yellow = approved fact types

Agreement is reached on the fact type name for the Rule Family. The fact type name in the dependent Rule Family is also changed to complete the inferential relationship.
The condition fact types to determine Policy Underwriting Risk are identified and given candidate fact type names.
Developing a Skeletal Decision Model – 11

The fact types to determine Insured Major Ownership Change are identified. They are all persistent fact types. The Rule Family is complete and no further supporting Rule Families are required.
The fact types to determine Insured Major Location Change are identified. They are all persistent fact types. The Rule Family is complete and no further supporting Rule Families are required.
A persistent fact type, Policy Annual Premium replaces the candidate fact type Maximum Premium for Automated Renewal. It is therefore moved below the dotted line.
A persistent fact type of Policy Discontinued Agent can be used instead of the candidate Insured Agent Change. The fact type is therefore moved below the dotted line.
It is determined that the persistent fact type Policy Discontinued Agent can be used instead of the candidate Insured Agent Change. The fact type is moved below the dotted line.
SMEs decide to establish a persistent fact type of Manual Underwriting Indicator, allowing an underwriter to flag policies for manual underwriting in the event the underwriter deems it necessary to override the other Decision Model logic. This means underwriters can do so based on conditions not noted in the Decision Model. This gives the underwriter the ability to use human decision-making within the Decision Model.
Developing a Skeletal Decision Model – 17

Through a process of governance the candidate fact types are approved. The skeletal model is complete.
Agenda

• Current State: Business Rules
• The Decision Model Bottom Up
• The Decision Model Top Down
• **Impact on Business Analysis**
• Architecting Decision Management
• Data Quality and The Decision Model
• Case Studies
• The Ways We Can Help
• How to Learn More
The Decision Model Difference in Process Models

Option 1

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

Option 2

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

Option 3:

Start → Determine Persons Credit Rating → End

Process Model

Decision Model Diagram

Decision Rule Family Table

<table>
<thead>
<tr>
<th>Rule Pattern</th>
<th>Person's Debt</th>
<th>Person's Employment History</th>
<th>Person's Credit Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Good</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>Low</td>
<td>Bad</td>
<td>?</td>
</tr>
<tr>
<td>1</td>
<td>High</td>
<td>Good</td>
<td>?</td>
</tr>
<tr>
<td>1</td>
<td>High</td>
<td>Bad</td>
<td>?</td>
</tr>
</tbody>
</table>
Simplify the Models, Improve the Solution, Now You Know How

Before

After
# The Business Decision Maturity Model (BDMM)

<table>
<thead>
<tr>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unmanaged</td>
<td>Visible</td>
<td>Agile</td>
<td>Aligned</td>
<td>Predictive</td>
<td>Autonomic</td>
</tr>
</tbody>
</table>

## Minimum

**BUSINESS VALUE**
- Risk of loss of business control high. Risk of business change is high. Ability to predict business impact of change is low. Cost of change is high.

**BUSINESS ARCHITECTURE**
- No Business Decision Management architecture to speak of.

**BUSINESS STEWARDSHIP**
- No Business Decision Management stewardship.

## Immature

**BUSINESS VALUE**
- Risk of loss of business control and business change is lower. Cost of changes is lowered. Ability to predict business impact of change is still low. Analysis of business decisions is possible, but is manual.

**BUSINESS ARCHITECTURE**
- Informal Business Decision Management architecture.

**BUSINESS STEWARDSHIP**
- Business Analysts lead business decision discovery for local logical development.

## Not Present

**BUSINESS VALUE**
- Risk of loss of business control greatly reduced at the project level; business change becomes possible through automated analysis. Ability to predict business impact of change is still low.

**BUSINESS ARCHITECTURE**
- Project level process and business decision standards established within broader architectural standards.

**BUSINESS STEWARDSHIP**
- Integration of Business Decisions with use cases and process flows with business metrics.

## Decisions Shared Across:

- Project level only
- Projects
- Enterprise
Agenda

• Current State: Business Rules
• The Decision Model Bottom Up
• The Decision Model Top Down
• Impact on Business Analysis
• **Architecting Decision Management**
• Data Quality and The Decision Model
• Case Studies
• The Ways We Can Help
• How to Learn More
**Process**

Column 2
HOW: (Function)
Zachman Framework\(^1\)

**Decision**

Column 6
WHY: (Motivation)
Zachman Framework\(^1\)

\(^1\) The Zachman Framework, is a Copyright work of John A. Zachman of Zachman International. A detailed explanation of the Framework may be found in The Decision Model: A Business Logic Framework Linking Business and Technology, Chapter 13. (von Halle and Goldberg, Taylor & Francis, 2009)

**Data**

Column 1
WHAT: (Data)
Zachman Framework\(^1\)
Decision Management Logical Architecture – BDMM (Level (4) Predictive, (5) Autonomic)

**ANALYZE**
- Models influence Business Process Changes
  - Dashboards
  - Business Intelligence
  - Quantitative Data

**DESIGN**
- BPMS Design Modeler
  - BPMS Modeler maps to Logical Data Model
  - BDMS describes a Decision Task: Outputs to BDMS for Decision View design
  - Models Determine: Decision Logic Change
  - BDMS Glossary maps to Logical Data Model

**EXECUTE**
- BPMS Execution Engine
  - BPMS deploys Model into Execution Engine
  - Decision Service
    - Decision Service executes BRMS Rules
    - (BRMS) publishes Decision Services
  - Execution Time: BPMS calls Decision Service
  - Business Rule Management System (BRMS)
    - BRMS R/W to operational Data Store
    - Operational Data Store

**Data**
- Sources
  - Data Warehouse
  - External Sources
  - Logical Data Model
  - Table
  - Table
  - Operational Data Store Maps to Logical Data Model
Enabling Software – Graphical Modeling, Business Based, Traceability
Enabling Software—Rule Family with Rigor, Full Glossary Support
Enabling Software – Workflow, Governance and Automated Deployment
Agenda

- Current State: Business Rules
- The Decision Model Bottom Up
- The Decision Model Top Down
- Impact on Business Analysis
- Architecting Decision Management
- **Data Quality and The Decision Model**
- Case Studies
- The Ways We Can Help
- How to Learn More
# Data Quality Framework

<table>
<thead>
<tr>
<th>DQ Dimension</th>
<th>Definition</th>
<th>Repository of Data Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Data Type</td>
<td>The determination that a fact value conforms to the predefined data type for its fact type. For example; date, integer, string, Boolean, etc.</td>
<td>• The Glossary will indicate, for each fact type, its data type.</td>
</tr>
<tr>
<td>2. Domain Value</td>
<td>The determination that a fact value falls within the fact type's valid range.</td>
<td>• The Glossary will indicate, for each fact type, its valid values.</td>
</tr>
<tr>
<td>3. Completeness</td>
<td>The determination that no additional data is needed. Completeness applies to fact types that are always required, those that are sometimes required (depending on circumstances), and those whose population is irrelevant.</td>
<td>• Decision Model Views within a process will indicate, for each fact type, whether it is required, optional, and the logic by which a fact type is sometimes required or irrelevant.</td>
</tr>
</tbody>
</table>
## Data Quality Framework (Cont.)

<table>
<thead>
<tr>
<th>DQ Dimension</th>
<th>Definition</th>
<th>Repository of Data Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Consistency</td>
<td>The determination that a fact value makes business sense in the context of related fact type/s fact values</td>
<td>• Decision Model Views within a process will provide the logic to determine consistency of values for related fact types.</td>
</tr>
<tr>
<td>5. Reasonableness</td>
<td>The determination that a fact value conforms to predefined reasonability limits.</td>
<td>• Decision Model Views within a process will provide the logic to determine whether a fact value is within sensible limits.</td>
</tr>
<tr>
<td>6. Accuracy</td>
<td>The determination that a fact value (regardless of the source) approaches its true value. Accuracy is typically classified into the following categories: 1. Accuracy to authoritative source 2. Accuracy to real world data (reality)</td>
<td>• Decision Model Views within a process will indicate the logic by which a fact value is determined to be as accurate as is necessary.</td>
</tr>
</tbody>
</table>
The Data Quality process is always determined by the business
Insurance Claim DQ Complete
Decision View Example

One DQ Complete Rule Family for each fact type tested for completeness
Insurance Claim DQ Complete
Rule Family View Examples

<table>
<thead>
<tr>
<th>Rule Pattern</th>
<th>Conditions</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Insurance Claim Type DQ Complete</strong></td>
<td>Is Complete</td>
</tr>
<tr>
<td></td>
<td>Auto License Plate Number DQ Complete</td>
<td>Is Complete</td>
</tr>
<tr>
<td></td>
<td>Insurance Claim Amount DQ Complete</td>
<td>Is Complete</td>
</tr>
<tr>
<td></td>
<td>Fact Type n... DQ Complete</td>
<td>Is Complete</td>
</tr>
<tr>
<td>1</td>
<td>Is Complete</td>
<td>Is Complete</td>
</tr>
<tr>
<td>2</td>
<td>Is No Complete</td>
<td>Is Not Complete</td>
</tr>
<tr>
<td>3</td>
<td>Is No Complete</td>
<td>Is Not Complete</td>
</tr>
<tr>
<td>4</td>
<td>Is No Complete</td>
<td>Is Not Complete</td>
</tr>
</tbody>
</table>

- Insurance Claim Type is ALWAYS required
- Auto License Plate Number is CONDITIONALLY required

- Add “Populated Characteristic” to a fact type name when testing to determine that a value has been provided
- The Operand for testing a Populated Characteristic is “Populated” and “Not Populated”
Insurance Claim DQ Consistent

Decision View Example

This approach should be used for all data quality dimensions
One More Data Quality Process Example

Determine Insurance Claim DQ Values is a super Decision that contains the conclusions for Consistency, Reasonableness, and Accuracy
Insurance Claim DQ Values

Decision View Example
Decision Model Data Quality Summary

• The Decision Model is an excellent solution for Data Quality and other database tasks that require business logic

• Data Quality process is determined by the business

• Do not mix logic for different data quality dimensions into a Rule Family

• Create one Decision Model View for each data quality dimension (can combine them together with a super Decision if needed)

• If a fact type is tested for accuracy, then consistency and reasonableness data quality checks are not needed
Agenda

• Current State: Business Rules
• The Decision Model Bottom Up
• The Decision Model Top Down
• Impact on Business Analysis
• Architecting Decision Management
• Data Quality and The Decision Model
• **Case Studies**
• The Ways We Can Help
• How to Learn More
## Project #1

### Major U.S. Financial Institution

### Problem/Opportunity

- Approval of Loans:
  - As-is based on 140 data elements
  - To-be grown to 470 data elements
- Uneven quality on approvals: (aka bad decisions!!)
- Frustrated customers
- Business policy change process was a 3 week cycle time with a capacity of 60 rule changes

### Result

- New business policy change process is a 2 week cycle time with a capacity of 100+ rule changes
- Included Decisions that encompassed all data points, not just delivered
- Integration with the deployment environment
- Elapsed time: 9-12 months
Project #1

Deliverables

- Process Models
- First Decision Model = 38 hours
- Customized view = 5 hours
- “High” complexity (12 RFs in first decision model, 7 RFs in customized view, 24 fact types in all)
- 5 other decision models, one with 70 RFs
- Then many more decision models with views
- Largest DM = 300 RFs, 44 pages

Challenges

- Original process model done by external company mixing process and logic
- Circular logic
- Discouraging “overthinking” versus trusting Decision Model normalization
- Policies described error-free conditions only
- “overloaded” fact types
- Policies had logic errors
- Some fact type values not available
<table>
<thead>
<tr>
<th>Problem/Opportunity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Data quality on received data in a major transaction system extremely poor</td>
<td>– Created decision models for data completeness and reasonableness of data values</td>
</tr>
<tr>
<td>– Too many transactions rejected due to inability to assess and correct data problems</td>
<td>– Improved messages for errors and response time for non-errors</td>
</tr>
<tr>
<td></td>
<td>– Elapsed Time: 12 weeks</td>
</tr>
</tbody>
</table>
Project #2

Deliverables
- Process Model
- Decision Models: 40
- Rule Families: 700
- Fact Types: 1400
- Persistent Fact Types: 750
- Inferred Fact Types: 650

Challenges
- Some fact type values not available
- Glossary was needed earlier
- Only non-compliant logic was supplied, needed to create the rest
Project #3

Major U.S. High Manufacturer

Problem/Opportunity

– Purchasing contracting system, subject of many attempts to improve, “evaded success”
– Lengthy, convoluted process, not understood by business
– Shipping and contracting terms across the international locations were subject of “tribal knowledge” and varied inconsistently between locations

Result

– “Spectacular success” (Client project lead quote)
– Simplified process with decision models
– Reduced significant inconsistencies (and errors) between all global locations
– Reduced anticipated time of project by one third
Project #3

Deliverables

– Simplified Process Models
– Decision Models: 8
– Rule Families: 81
– Decision Models built: 8 weeks

Challenges

– Globally distributed client team
– Skeptical team members
– Very tight project schedules
– Limited budgets
## Project #4

### Major U.S. Financial Institution

<table>
<thead>
<tr>
<th>Problem/Opportunity</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Process described in 80 pages</td>
<td>– Crisis Averted</td>
</tr>
<tr>
<td>– Transaction volume increasing</td>
<td>– Simplified and automated process with decision models</td>
</tr>
<tr>
<td>– Business logic incomplete, inaccurate, ambiguous</td>
<td>– Transactions, regardless of errors, run 3 mins 30 secs instead of 90 hours</td>
</tr>
<tr>
<td>– Process for set of transactions requires 30 or 90 hours, depending on errors</td>
<td>– Most test cases are automated</td>
</tr>
<tr>
<td>– Cannot complete new volumes in allocated time</td>
<td>– A new release is tested in 30 minutes to 2 hours</td>
</tr>
<tr>
<td>– Want messages indicating all errors</td>
<td>– Elapsed time: 10-12 weeks</td>
</tr>
<tr>
<td>– Most errors are DQ errors!!</td>
<td></td>
</tr>
</tbody>
</table>
Project #4

Deliverables

– Simplified Process Models
– Decision Models: 5
– Rule Families: 95
– Decision Models built: 5 weeks
– Decision Models programmed: 5 weeks
– Test Cases: 2200
– Test Cases tested: 2 weeks

Challenges

– Not sure Decision Model could fix the problem
Agenda

- Current State: Business Rules
- The Decision Model Bottom Up
- The Decision Model Top Down
- Impact on Business Analysis
- Architecting Decision Management
- Data Quality and The Decision Model
- Case Studies
- **The Ways We Can Help**
- How to Learn More
KPI Engagement Model

**Skills and Knowledge Transfer**
- Training
- Certification
- Mentoring
- Center of Excellence

**Scope Engagement**
- Increment 1 (3 Months)
  - Fixed price
  - Time boxed
- Increment 2 (3 Months)
  - Fixed price
  - Time boxed
- Increment n (3 Months)
  - Fixed price
  - Time boxed

**Target Project**
- Increment 1 (3 Months)
- Increment 2 (3 Months)
- Increment n (3 Months)

**STEPment**
- On
- Off-Site

**Environment for Decision Management**
- KPI Provided Tools
- Select Tools
- Implement Tools
- Automate Integration
Agenda

• Current State: Business Rules
• The Decision Model Bottom Up
• The Decision Model Top Down
• Impact on Business Analysis
• Architecting Decision Management
• Data Quality and The Decision Model
• Case Studies
• The Ways We Can Help
• **How to Learn More**
How to Learn More

Visit www.kpiusa.com
www.goodmethodsglobal.com

• FREE PRIMER
• Updated Events
• Download White Papers
• News

Become a member of the open Linkedin
The Decision Model Group

Read our articles and buy our books

Join our presentations

Contact us
information@kpiusa.com
Phone +1 973 543-1339

Try It Yourself:
Ask for “free” Visio and Excel Templates
lgoldberg@kpiusa.com

Discuss with us how to apply The Decision Model for your Requirement or Business Rules project.