The Decision Model: A Refresher and Recent Advances

ABSTRACT

The recent financial crisis underscores the vital role of data quality and decision quality. Related challenges include improving operational decisions, complex processes, business-automation life cycles, and executing unprecedented transaction volumes. A new, emerging discipline for meeting these challenges, called decision modeling, is an important part of the solution at Freddie Mac.

Part 1 introduces decision modeling. Like the Relational Model, The decision model is a technology and methodology independent model. It is a model for logic, not data. Its theoretical foundation includes normalization principles yielding rigor. Business experts use decision modeling to maintain data quality and operational decision logic. IT solutions consume whole decision models without technical translation, shortening maintenance cycles.

Part 2 focuses on the mortgage industry. Using real-world statistics, Freddie Mac explains how decision modeling enables quick analysis and implementation of policy changes. The presentation explains cultural changes when business people access visual representations of decision models.
BIOGRAPHY

Barbara von Halle
Managing Partner
Knowledge Partners International, LLC

Barbara von Halle is Managing Partner of Knowledge Partners International, LLC (KPI). She is co-inventor of the Decision Model and co-author of The Decision Model: A Business Logic Framework Linking Business and Technology published by Auerbach Publications/Taylor and Francis LLC 2009. The book reveals ground breaking theory. An early reviewer states "This book can become one of the classic books of a new era in computing that will have much traction in the next few years" - Opher Etzion, Ph.D., IBM Master Inventor. Barb writes, with Larry Goldberg, a regular column in TDAN on the Decision Model as well as Modern Analyst.

As the fifth recipient of the Outstanding Individual Achievement Award from International DAMA, Barb inducted into the Hall of Fame in 1995. Known as a data architecture and business rules pioneer, she has consulted for over 25 years. She is an invited keynote speaker at conferences in the US and Europe. She was a very popular columnist in Database Programming and Design magazine for many years.

Her first book, Handbook of Relational Database Design published by Addison-Wesley since published in 1989 has over 21 printings and been cited in 28 books. A recent review on amazon.com "Still the best working reference... The only reference book I recommend to anyone needing to understand relational database design" - M.C. Kettelhut, Ph.D."

Other book publications include Business Rules Applied and The Business Rule Revolution. Her recent article in Intelligent Enterprise magazine was voted one of the top articles of the year and features case studies from Oregon State, Freddie Mac, Dell Financial Systems, and Pershing LLC.

Barb has consulted in Enterprise Data Architecture and Decision Modeling including clients in the following industries: healthcare, insurance, financial services, package delivery, pharmaceutical, consumer products, and others.

She is an invited speaker at various conferences including IIBA organizations, DAMA organizations, BPM conferences, and vendor user groups conferences.

Barb founded KPI in 1995 as a Data Architecture Consulting company and transformed it over time into a business rule, business decision management, and Decision Modeling company with Larry Goldberg.
Larry Goldberg
Managing Partner
Knowledge Partners International, LLC

Larry Goldberg is Managing Partner of Knowledge Partners International, LLC (KPI), has over thirty years of experience in building technology based companies on three continents, and in which the focus was rules-based technologies and applications. Commercial applications in which he played a primary architectural role include such diverse domains as healthcare, supply chain, and property & casualty insurance.

Larry is co-author of The Decision Model: A Business Logic Framework linking Business and Technology (Auerbach, 2009), a co-editor of The Business Rule Revolution: Running the Business the Right Way (HappyAbout.info 2007), is on the editorial board of www.BPMInstitute.org and is the Editorial Director of the BDM Bulletin, a monthly e-publication of the BPMInstitute.org.


He may be heard, four times a year, as the track chair of the BDM Symposium at the Brainstorm conference, and at many conferences and industry events around the world. He and Barbara von Halle conduct a very popular series of training seminars on Business Decision Management and the Decision Model, both in person and on-line.

Larry can be found at www.TheDecisionModel.com and looks forward to hearing from everyone with an interest in decision management, business rules, BDM, EDM, and BPM.

Tom Schweikert
Business Rules Manager, Information & Decision Mgmt
Freddie Mac

Tom is a KPI-certified Decision Model Analyst, actively working to enhance the way Freddie Mac manages business rules. Prior to joining the Information & Decision Management organization at Freddie Mac, Tom spent four years as a Credit Manager in the Single Family Credit Guarantee organization. Before joining Freddie Mac, Tom held various roles in the Secondary Mortgage Market function at a privately held mortgage company.
Who is KPI?

Publications

Thought Leader

The Decision Model
Business Logic Framework
Business with Technology
Business Process Management
Business Decision Management
Business Rule Management
Enterprise Architecture
Business Analysis

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

Experience

Financial Services
Insurance
Healthcare
Government
Utilities
Transportation
Telecommunication
Energy

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Agenda

- **Current State: Business Rules**
- The Decision Model Bottom Up
- The Decision Model Top Down
- Impact on Business Process
- Recent Advances
- How to Learn More
Business Logic

Does this look better?

Business Process Model

How

Business Logic

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

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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
- As many conditions as needed, even zero
- All conditions ANDed together
- No Ors, ELSEs, BUTs, OTHERWISEs (these have created the chaos in current systems!)

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
We see that the conclusion is “A person is highly likely to default on a loan”
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>Person Credit Score</td>
<td>Person Employment History</td>
</tr>
<tr>
<td>Is less than 650</td>
<td>is</td>
</tr>
</tbody>
</table>

We identify conditions leading to the conclusion

### Two Rule Families

<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>Person Credit Score</td>
<td>Person Employment History</td>
</tr>
<tr>
<td>Is less than 500</td>
<td>is</td>
</tr>
</tbody>
</table>
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Decision Model Notation
Decision Model Notation

Determine Policy Renewal Method

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

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


Decision Model Notation

Determine Policy Renewal Method

Policy Pricing Within Bounds
Policy Discount
Policy Tier

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

Policy Pricing Within Bounds
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Determine Policy Renewal Method

Policy Pricing Within Bounds
Policy Discount
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is Nonstandard</td>
<td>Is No</td>
<td>Is</td>
<td>N/R</td>
</tr>
<tr>
<td>2</td>
<td>Is No</td>
<td>Is No</td>
<td>Is</td>
<td>N/R</td>
</tr>
<tr>
<td>3</td>
<td>Is No</td>
<td>Is Yes</td>
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Policy Pricing Within Bounds
Policy Discount
Policy Tier

Determine Policy Renewal Method

Policy Pricing Within Bounds
Policy Discount
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When is it Finished? How Big Are They?

Policy Pricing Within Bounds
  Policy Discount
  Policy Tier

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

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Option 1: The Decision Model Difference in Process Models

Option 2

Option 3: Decision Model Diagram

Decision Rule Family Table

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Evolution since the Book

- **Advances in Practice**
  - Organizations are successfully creating and deploying decision models
  - Advanced topics emerging: Decision Model Views, Automated Testing and Decision Model Messaging
  - Use of Business Decision Maturity Model (BDMM) is growing
  - Supporting technology is appearing
    - OpenRules-BR engine
    - RuleGuide-BR repository
    - Sapiens - BDMS BDMM 4 Decision Management

- **Rate of Adoption**
  - Growing KPI Practice, STEP methodology
  - Volume of emails from adopters, LinkedIn membership
  - Soaring attendance at webinars soaring
  - Consistently rising book sales

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Project #1: Business Decisions and Data Quality (3 Months)

**Business Motivations**
- Increase customer satisfaction
- Improve DQ
- Reduce errors in critical transaction
- 98% error-free by 4Q2011
- 100% error-free by 2012?
- Reduce risk of transactions (delinquent contracts)
- No way to measure before because 98% rules were all over

**Challenges, Deliverables**
- Policies described error-free conditions, had to discover error conditions
- “overloaded” fact types
- Policies had logic errors
- 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
  - Some fact type values not available
- 5 other decision models, one with 70 RFs
- Largest DM = 300 RFs, 44 pages
Project #2: Business Decisions
(3-Months)

- **Updated Process Models**

- **Decision Models:**
  - Number of Decision Models: 40 (approx.)
  - Number of Rule Families: 700 (approx.)

- **Glossary:**
  - Total Number of Fact Types: 1,400 (approx.)
  - Number of Persistent Fact Types: 750 (approx.)
  - Number of Inferred Fact Types: 650 (approx.)

Project #3: Process Improvements
(3 Months)

- **Before The Decision Model:**
  - 200 transactions with errors ➔ 90 hrs
  - 200 transactions without errors ➔ 30 hrs

- **After The Decision Model:**
  - 200 transactions with errors ➔ 3 mins 30 secs (with error messages and step by step instructions on how to correct each error)
  - 200 transactions without errors ➔ 3 mins 30 secs
Project #3: How?

- Business logic with no room for misinterpretation
- Business logic easy to understand
- Business logic updated without changing the process and visa versa
- Business logic changed in the system within two business days

Project #3: Statistics

- **5 Decisions**
  - 95 Rule Families
- **10 Weeks**
  - The Decision Models created in approximately 5 weeks
    - Included two iterations of validation
    - Improvements were added through the project (iterative) as a result of analysis
  - Decision Models were programmed and tested in approximately 5 weeks
    - New plans will reduce this time
    - Business rules engine will be ready to run as a service early next year
- **30-60 Hours of Testing**
  - 2,200 test cases created in approximately 2 weeks
  - Most test cases are automated
  - A new release takes 30 minutes to 2 hours to test

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