

INSIGHTS FOR SUCCESS



Which Decisions Belong in Decision Models?

By Barbara von Halle

In October 2009 [1], this column revealed the new model for representing business logic, called The Decision Model (TDM). Since then, a new kind of software emerged to support it. A short time ago, the BABOK [2] team approved decision modeling to replace the use of process models for decision logic. Most recently, in a press release issued on Jan 17, 2014, the Object Management Group (OMG) [3] voted to publish the Decision Model and Notation (DMN) specification, endorsing decision modeling [4] as a new standard for software development.

So, What's New?

Of course, decisions aren't new. Certainly, the concept of business logic as conditions leading to conclusions is not new. After all, business analysts have been documenting decision logic for decades – in spreadsheets, lookup tables, business rule management systems, formal grammar templates, single decision tables, decision trees, and sometimes program code.

So, what's new now? A shift is occurring. Not only are decision models sanctioned as a new kind of deliverable, but thousands of them already operate in production systems serving major corporations. What's new now is the emergence of an important question: what kinds of decisions belong in decision models and why?

If your organization already has experience with decision models, the benefits of those models will assist you in answering this question. However, if decision modeling is new to your organization, consider the criteria in Table 1. These have assisted other organizations in deciding which decisions belong in decision models, with and without supporting software.



Which Decisions Belong in Decision Models?

Seven Criteria for Decision Models	Description
1. Business Governance	Giving business representatives direct control over decision logic for important decisions from creating, changing, validating, and testing
2. External Governance	Managing decisions whose rightful author and change agent is external to the organization
3. Customized Governance	Managing decisions for which there are differences in decision logic based on business context, such as different logic for geographical locations, political jurisdictions, or customer categories.
4. Technology Flexibility	Selecting and changing the technology for automated decisions without changing the decision model logic
5. Business ROI	Predicting and measuring considerations by which a decision contributes to the health and well-being of a business
6. Agility and Velocity of Change	Enabling frequent, quick, and effective decision logic changes
7. Decision Logic Complexity	Simplifying, estimating decision models that are large in size (i.e., quantity of structures, fact types, etc.) or intricate in logical expressions and dependencies

Table 1: Criteria for Decisions that Belong in Decision Models

One way to understand how TDM supports these criteria is to list the basic characteristics of TDM shown in Table 2 and correlate these to the seven decision model criteria in Table 1.

Four TDM Characteristics	Details
1. TDM Decision Model Structure	<ul style="list-style-type: none"> ■ Single format (although not tied to a specific notation) ■ Well-scoped (starting point and ending point pre-defined by the structure, from business decision to raw data) ■ Simple business-friendly format (devoid of any technology concerns) ■ Normalized into the smallest manageable and reusable pieces ■ Structures connected by pure logic dependencies ■ Views of entire decision models to support customized logic ■ Serves as the single point of change, no more updates directly to program code
2. TDM 15 Principles	<ul style="list-style-type: none"> ■ Structural Principles, Technology-Independent (declarative) Principles, Integrity Principles ■ Combination of structure and principles makes it faster to create and automate decision logic than other approaches



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3. Technology-Independence	<ul style="list-style-type: none"> ■ Business glossary of only business names, business definitions, business data types, and business domain values ■ Business glossary independent of physical data technology ■ Decision model structure and content independent of execution technology
4. Foundation for Software Innovation	<ul style="list-style-type: none"> ■ Automatic validation of the 15 TDM principles against entire decision models prior to deployment ■ Automatic test case generation and execution of entire decision models prior to deployment ■ Automatic full-life cycle possible from business to IT ■ Version control of business glossary entries and decision model pieces ■ Messaging

Table 2: Important Characteristics of TDM Decision models

Criteria #1: Business Governance

By far, the most common and strongest motivation for adopting TDM is to deliver true business governance over decisions. Let's explore what this means and why it is so important.

The word "governance" means empowering the rightful authority to serve as the author and change agent. The important phrase "business governance" means giving business representatives[5] **UdirectU** control over the logic for important decisions without having to know any technical details. Today, prior to The Decision Model, ultimate governance over decision logic often lies with IT people who translate business people's (or business analyst's) logic into executable code. As time goes on, the executable code becomes the official source for the logic, mostly because subsequent changes are made directly to the program code.

TDM is, by design, a game-changer in the area of business governance in two ways. First, TDM allows non-technical business-oriented people to create, change, and correct errors in decision models before turning the models over to IT for automation. Second, TDM allows technical people to easily deploy those decision models to technology.

There are three options in delivering business governance, each one more mature than the previous.



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Option 1: Documented Decision Models

(Decision Model Structure with 15 Principles)

Business representatives create and change decision model diagrams and corresponding logic based only on the business glossary and in conformance with TDM 15 principles. In this way, business representatives find errors by manual inspection usually during decision model review sessions. Once approved, business representatives then submit the decision models to IT for subsequent testing and production deployment

Option 2: Validated Decision Models

(Decision Model Structure, 15 Principles, Automatic Software Validation)

Business representatives create and change decision models and corresponding logic. In addition, software validates entire decision models against the principles, pointing out errors needing correction. Business representatives, after approval, then submit the corrected decision models to IT for testing and production deployment. These models have a higher likelihood of being correct than those in Option 1 due to their automated validation.

Option 3: Validated and Tested Decision Models

(Decision Model Structure, 15 Principles, Automatic Software Validation, Automatic Test Case Generation, and Execution)

Business representatives create, change and validate decision model diagrams and logic. In addition, software generates test cases, and guides in their testing. Business representatives approve then submit the decision models to IT for production deployment.

Option 4: Validated, Tested, and Deployed Decision Models

(Decision Model Structure, 15 Principles, Automatic Software Validation and Testing, and Software Assisted Deployment)

Business representatives create, change, validate, and test decision models using software. Once approved, business people submit these to IT who deploys them in production using pre-created technology adaptors or implementation approaches.



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Criteria #2: External Governance

The phrase “external governance” implies that the rightful authority as author and change agent for decision logic is outside the organization, such as a regulatory agency. When decision logic is under external governance, the organization itself has no control over when the decision logic needs to be changed and how quickly the change needs to be in play. Decision models provide better control over ability to make changes dictated from the outside.

Criteria #3: Customized Governance

The phrase “customized governance” implies the need to support differences in decision logic based on business context, such as different logic for geographical locations, political jurisdictions, or customer categories. Customized governance may also imply that there are different rightful authorities for authoring the logic variations.

For example, determining mortgage eligibility includes making decisions about property, borrower, and other criteria. This logic may be different for different mortgage programs. Therefore, each of these decisions may exist in several decision model views, one for each mortgage program. Likewise, logic for student financial aid eligibility may exist in different views for different kinds of students. Most familiar may be logic behind different healthcare policies that differs by state or province.

Criteria #4: Technology Flexibility

In the context of this article, the phrase “flexible technology governance” means that IT is able to select and change the execution technology for automated decisions with no changes to the logic itself. Technology flexibility supports the migration of a decision model from one technology to another as well as deployment of a single decision model to multiple technologies. This flexibility in decision model deployment renders the IT department less dependent on one technology vendor.

Criteria #5: Business ROI

The acronym “ROI” in this article means the considerations by which a decision model contributes to the health and well-being of a business. These considerations may be measured financially, legally, and by organizational uniqueness or leadership, for example.

Decisions with ROI measured financially and legally include the following.

Penalties: If decision logic has legal and financial ramifications, such as heavy fines for violations, these decisions are very appropriate for decision models. Metrics can be collected to measure how much such fines are decreased when these models are put into play.

Defense/audit: For decision logic requiring specific auditing or traceability, decision models are useful because messages for each Rule Family row can capture actual execution information for auditing purposes.

Volume-based Value: Much of the decision logic executing in production transaction systems is simple and generates a small financial value for each execution. However, if it executes thousands of times a day, its financial value is significant and therefore these decisions are worth the time and money of putting them into decision models.

Decisions with ROI measured by organization uniqueness or leadership include the following.

Proprietary: Many organizations possess some decision logic that is proprietary because it is core to how an organization differentiates itself regarding excellence and competitive advantage (e.g., underwriting logic). These decisions are also



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appropriate for decision models because the logic becomes tangible to the business experts (probably more tangible than it is otherwise), thereby becoming a central point for improvement.

Innovation: A decision that is new to an organization (i.e., its logic has never been determined before) is a wonderful candidate for decision models. Designing these models through business brainstorming sessions can lead to optimum logic, perhaps validated, tested, and changed prior to putting it into action.

Criteria #6: Velocity and Agility of Change

Here, “velocity of change” refers to how **frequently** an organization needs to change the logic behind a decision. For logic that changes frequently, decision models are valuable.

The phrase “agility of change” refers to how **quickly** and **effectively** an organization can make a change to the decision logic. How quickly changes can be made to decision models depends on which of the Business Governance options (listed above) are available.

Criteria #7: Decision Logic Complexity

The phrase “decision logic complexity” refers to the quantity and nature of the core characteristics of decision models resulting from TDM principles. These core characteristics include Rule Families, Rule Family rows, Rule Patterns, and Fact Types.

After years of experience with The Decision Model, it is possible to define general boundaries for simple, medium, and complex decision models. Table 3 provides guidance in this area.

Decision Model Sizing and Complexity	Simple Logic	Medium Logic	Complex Logic
Quantity of fact types in a Rule Family	Less than 3	4 to 7	Greater than 8
Quantity of rows in a Rule Family	2 to 5	6-10	Greater than 10
Quantity of Rule Patterns in a Rule Family	1	2	Greater than 2 *except if these are due to simple diagonal “otherwise” rows
Quantity of Rule Families in a Decision mode	1 to 4	5 to 20	Greater than 20 (often 100-200)

Table 3: Decision Model Sizing and Complexity



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While decision models are useful for simple decision logic, they are even more so for complicated decision logic. That's because the TDM principles produce decision models comprised of the simplest, most atomic logic structures and their connections based on formal normalization theory.

Wrap Up

Table 4 presents a correlation of the criteria for decision models from Table 1 to the TDM characteristics from Table 2 that support each one. An X in a cell means that the corresponding TDM characteristic is crucial to supporting the criteria in that row. Information in parenthesis provides useful details, for clarification.

It is no surprise that the TDM structure and the 15 principles are critical components for delivering all criteria.

Criteria For Decision models	Important TDM Characteristics			
	TDM Structure	TDM 15 Principles	Technology-Independence	Foundation for Innovative Software
1. Business Governance	X	X	X (technology-independence for both decision models and business glossary)	X
2. External Governance	X	X		X (messages for auditing)
3. Customized Governance	X (Views created by business people, normalized structures for reuse)	X	X (ability to deploy different views to different technology)	X (software maximizing reuse)
4. Technology Flexibility	X (easy to automate in current technology, easy to change technology without changing decision models, freedom from vendor, no technology restrictions)	X	X (easy to change data source because business glossary is separate from data technology)	X (provide full life cycle of decision models from creation to deployment)



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5. Business ROI	<p style="text-align: center;">X</p> <p>(whole decision model can be associated with business metrics, easy to tune a model missing the mark due to normalization, easy to brainstorm and fast creation during brainstorming sessions)</p>	<p style="text-align: center;">X</p>		
6. Velocity and Agility of Change	<p style="text-align: center;">X</p> <p>(fast to make changes to normalized structures)</p>	<p style="text-align: center;">X</p> <p>(easy to make changes and validate against principles for correctness)</p>	<p style="text-align: center;">X</p> <p>(business glossary and decision models separate from technology)</p>	<p style="text-align: center;">X</p> <p>(software support for versioning glossary and decision models, business people able to create, validate, test prior to handing over to IT)</p>
7. Complex Logic	<p style="text-align: center;">X</p>	<p style="text-align: center;">X</p>		<p style="text-align: center;">X</p> <p>(ability to validate and generate test cases for entire complex decision models,</p> <p>Ability to test “decision flows” without a process model)</p>

Table 4: Correlation of Criteria to TDM Characteristics



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Have We Been Here Before?

Not so long ago, a new model for representing data, called the relational model, was published and supported in new kind of software.

Of course, data wasn't new. Data professionals had been delivering data for decades – in hierarchies, networks, indexed files and sequential files. Yet, a shift lay ahead and the question emerged: what kind of data belonged in relational representation? Today, we know the answer: all of it, or most of it [6]. It wasn't long before corporations prioritized and migrated most operational data into a relational form. And relational data delivered on its promises.

So today, we ask the same question regarding decision logic and decision models: which decisions belong in decision models? The answer may turn out to be: all of them or most of them [7]. If so, this is the time to develop criteria, prioritize, and start delivering confidently on the promises of decision modeling.

- [1]. <http://www.modernanalyst.com/Resources/Articles/tabid/115/articleType/ArticleView/articleId/1104/The-Missing-Model-for-Business-Analysts.aspx>
- [2]. BABOK stands for “Business Analyst Book of Knowledge”
- [3]. The Object Management Group (OMG®) is an international, open membership, not-for-profit computer industry standards consortium. Founded in 1989, OMG standards are driven by vendors, end-users, academic institutions and government agencies. OMG Task Forces develop enterprise integration standards for a wide range of technologies and an even wider range of industries. For more information, go to (<http://www.omg.org/>)
- [4]. It is important to recognize that the OMG DMN and TDM have similar goals and characteristics but there are important differences. The OMG DMN specification is a notation, metamodel, and new language. It supports various representations and does not contain specific model principles. The Decision model is a formal model defined by principles depicting its structure, technology-independence, and integrity. It is not a notation. In fact, any notation will suffice if it is not the same as that for other kinds of models and it makes visible the inherent properties defined by the principles. DMN is new as of 2014 while TDM has been in use in major corporations and production systems for several years.
- [5]. Business representative can be a business subject matter expert or business analyst.
- [6]. Specifically, structured data.
- [7]. Specifically, decisions of conditions leading to conclusions.



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Barbara von Halle 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.

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