BPMN Modeler Report

Origination Example

Published: 8/31/2017

By: Brian Stucky, George Barlow, Denis Gagne

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Origination Example

Overview

This challenge is intended to demonstrate different decision modeling approaches using the same well-known business use case. The Loan Origination problem described in in the Section 11 of the DMN specification is probably the most discussed use case.

[...]

This challenge is not a competition of tools. Today there are many tools that claim their support of the DMN standard. Submitters may use these or any other tool to demonstrate how to create loan origination decision models which they consider to be the best from business (!) decision modeling, execution, and further maintenance perspectives.

https://dmcommunity.org/challenge/challenge-june-2017/

OVERVIEW / PROCESS (DM ORIGINATION PROCESS)

This report, like all the others in the Trisotech submission, was generated from a single click of a menu-ribbon button on the Import-Export Menu of the BPMN Modeler. This export to both Word and and HTML format is available as a standard feature of the modeler.

Our view of the Origination Process example as presented in the DMN spec was that it was a somewhat unrealistic view of the lending process and was overwrought in the solution in an attempt to demonstrate all the modeling capabilities of DMN. While it was successful in serving as a showcase for decision modeling robustness, the resulting solution was also not something we'd consider business friendly. That said, we had several goals in creating our solution:

1. A business friendly solution that could be easily managed by business analysts.
2. Using Business Knowledge Models (BKMs) as they are truly intended: to enable logic reuse for those components we'd expect to see in numerous decision points of a lending business process.

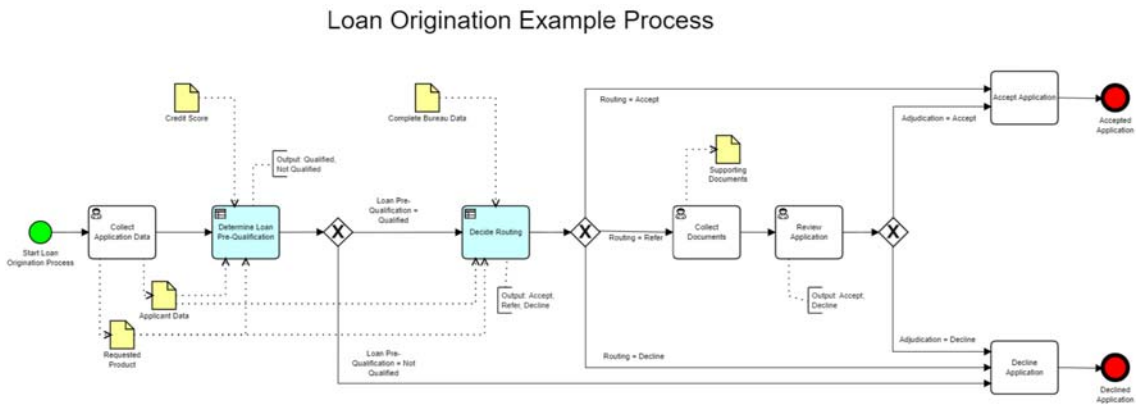
3. Introducing some additional decision logic to more accurately represent pre-qualification of a prospective borrower.

4. Taking advantage of the full FEEL language available to us in Conformance Level 3.

To that end, our business process remains essentially unchanged for the purposes of this exercise. We would hope to execute the Bureau Strategy with a minimal amount of outside information; perhaps collecting only a FICO score to accompany the borrower's loan application thus lowering the initial cost should the credit score prove too low to continue. Should we move successfully past this state, the Routing Strategy can utilize a more significant bureau call to incorporate additional data. Our changes take place in the decision models.

Loan Origination Example Process

Diagram



Elements

Start Loan Origination Process (Start Event)

Description

This is the standard BPMN start event.

W5

Trigger	Collect Application Data

Collect Application Data (User Task)

Description

In this activity we acquire the basic applicant and product data to begin this process instance.

W5

Output	Applicant Data, Requested Product
Trigger	Start Loan Origination Process

Requested Product (Data Object)

Description

This is structured data captured in the Collect Application Data activity.

Requested Product			
	1	Product Type	Text
	2	Rate	Number
	3	Term	Number
	4	Amount	Number

W5

Output	Collect Application Data
Input	Determine Loan Pre-Qualification, Decide Routing

Applicant Data (Data Object)

Description

This is structured data acquired in the Collect Application Data activity:

Applicant Data			
	1	Age	Number *(18..120)*
	2	Marital Status	Text *"S", "M"*
	3	Employment Status	Text *"Unemployed", "Employed", "Self-Employed", "Student"*
	4	Monthly	1 Income — Number 2 Repayments — Number 3 Expenses — Number
	5	Existing Customer	Boolean

W5

Output	Collect Application Data
Input	Determine Loan Pre-Qualification, Decide Routing

Credit Score (Data Object)

Description

Here is the format of the Credit Score data:

Credit Score			
	1	FICO	Number

W5

Input	Determine Loan Pre-Qualification

Determine Loan Pre-Qualification (Business Rule Task)

Description

This activity calls the decision Loan Pre-Qualification, a Trisotech DMN Decision service which returns either "Qualified" or "Not Qualified".

W5

Input	Credit Score, Requested Product, Applicant Data

Complete Bureau Data (Data Object)

Description

Here is the format of the structured data acquired from the Credit Bureau:

Bureau Data	1	Bankrupt	Boolean
	2	Credit Score	Number

W5

Input	Decide Routing

Decide Routing (Business Rule Task)

Description

This activity calls the decision Routing, a Trisotech DMN Decision service which returns either "Accept", "Return" or "Decline".

W5

Input	Complete Bureau Data, Requested Product, Applicant Data

Collect Documents (User Task)

W5

Output	Supporting Documents

Supporting Documents (Data Object)

W5

Output	Collect Documents

Review Application (User Task)

Description

In this activity, a human reviewer looks over the application and determines whether to "Accept" or "Decline" the application

Accept Application (Task)

W5

Result	Accepted Application

Decline Application (Task)

W5

Result	Declined Application

Accepted Application (End Event)

W5

Result	Accept Application

Declined Application (End Event)

W5

Result	Decline Application

DMN Modeler Report

Loan Pre-Qualification

Published: 8/31/2017

By: Brian Stucky, George Barlow, Denis Gagne

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Loan Pre-Qualification

Overview

DETERMINE LOAN PRE-QUALIFICATION (LOAN PRE-QUALIFICATION DECISION MODEL)

This report, like all the others in the Trisotech submission, was generated from a single click of a menu-ribbon button on the Import-Export Menu of the DMN Modeler. This export to both Word and and HTML format is available as a standard feature of the modeler.

This decision model was created to do a quick pre-qualification using only the FICO score and applicant data. The reason for this decision is to weed out applicants with insufficient basic scores while pulling only a FICO score from the bureau - which should result in less costly long-term bureau access fees. The original core logic was supplemented with basic loan pre-qualification decisions – evaluating the debt-to-income ratio (DTI or back-end ratio), evaluating the PITI (principal+interest+tax+insurance) ratio (PITI or front-end ratio), and doing a quick evaluation of the FICO score.

You will note several improvements in this implementation:

1. We have removed the superfluous use of boxed contexts solely for the sake of improving readability. Using BKMs frequently gives us this readability.

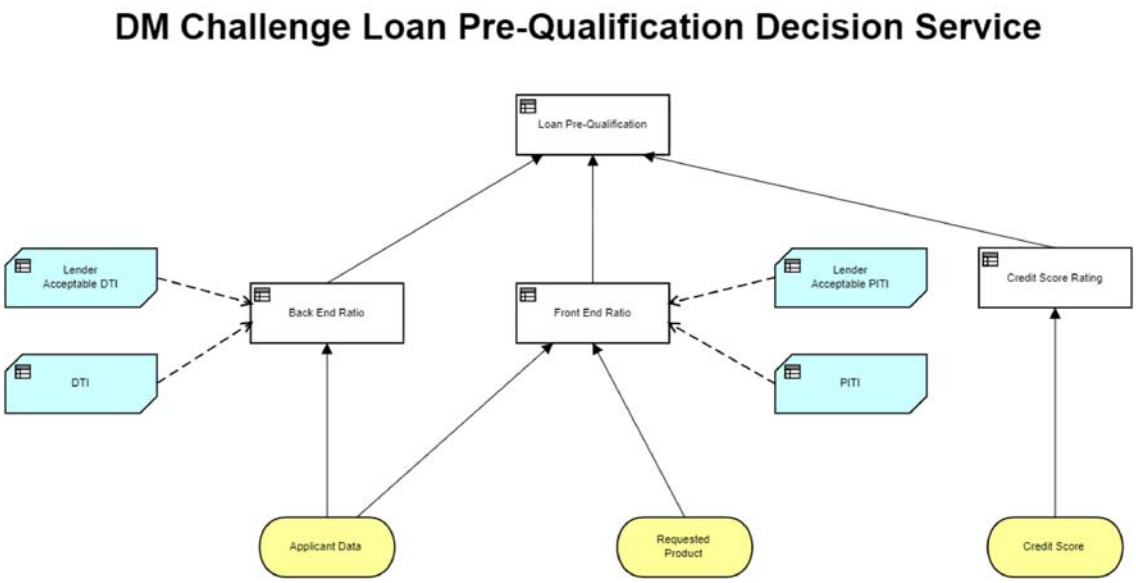
2. The core decision tables contain that logic most frequently changed and it is presented in a fashion that should be extremely clear to business analysts (loan officers in this case).

3. Our PITI evaluation uses a boxed context to derive the appropriate ratios. Again, this is a straightforward derivation that does not change. These calculations can be created once, reused, and do not require business user management. We've also used a BKM literal expression to define the baseline PITI ratio: 28%. This is usually the starting point for determining a basic pre-qualification (the PITI <= 28% of the borrower monthly income). However, this is also where we expect a loan officer to manipulate the ratio. For example, the ratio may be raised (to say 30%) if the borrower has an extremely high FICO score. The loan officer could also use this number as a hypothetical to give the prospective borrower a sense of what kind of loan amount he could truly afford. By defining the value simply and clearly as a literal here, it can easily be changed by the business user.

4. The DTI evaluation is implemented in a similar fashion. In this case, the baseline number is 36% (borrower's monthly debt should be <= 36% of the borrower's monthly income). The same benefits are reached with this implementation mechanism.

Loan Pre-Qualification DRD

Decision Requirement Diagram



Elements

Loan Pre-Qualification (Decision)

Description

This decision determines if a prospective borrower is prequalified for a mortgage loan.

The borrower will be either Qualified or Not Qualified.

This decision depends on three other decisions:

1) Is the borrower's Debt to Income (DTI) Ratio, sometimes called the back-end ratio, sufficient

2) Is the borrower's Credit Score Rating sufficient

3) Is the borrower's Principal, Interest, Taxes and Insurance (PITI) to income ratio, sometimes called the front-end ratio, sufficient?

The decision logic is a decision table with a first-hit policy using the three factors (Decisions) above as the inputs and returning both the the decision determining if the applicant is qualified and a text reason for the decision.

Question and Answers

Question	Is borrower successfully prequalified for the requested loan?
Allowed Answer	Qualified Not Qualified Decision Reason

Decision Logic (Decision Table)

Loan Pre-Qualification
Loan Qualification

F	Credit Score Rating	Back End Ratio	Front End Ratio	Loan Pre-Qualification		Description
				Qualification	Reason	
	"Poor", "Bad", "Fair", "Good", "Excellent"	*"Insufficient", "Sufficient"*	*"Sufficient", "Insufficient"*	*"Qualified", "Not Qualified"*		
1	"Poor", "Bad"	-	-	"Not Qualified"	"Credit Score too low."	
2	-	"Insufficient"	"Sufficient"	"Not Qualified"	"Debt to income ratio is too high."	
3	-	"Sufficient"	"Insufficient"	"Not Qualified"	"Mortgage payment to income ratio is too high."	
4	-	"Insufficient"	"Insufficient"	"Not Qualified"	"Debt to income ratio is too high AND mortgage payment to income ratio is too high."	
5	"Fair", "Good", "Excellent"	"Sufficient"	"Sufficient"	"Qualified"	"The borrower has been successfully prequalified for the requested loan."	

Lender Acceptable DTI (Business Knowledge Model)

Description

This Business Knowledge Model (BKM) is a FEEL Literal Expression used by the Back End Ratio decision logic. It is simply a decimal number >0 and <=1.00 that represents the Lenders policy for acceptable DTI. It has been included in a separate BKM to make it simple to find and change as well as for reuse purposes.

Decision Logic (Literal Expression)

Lender Acceptable DTI
Number

```
0.36
```

Lender Acceptable PITI (Business Knowledge Model)

Description

This Business Knowledge Model (BKM) is a FEEL Literal Expression used by the Front End Ratio decision logic. It is simply a decimal number >0 and <=1.00 that represents the Lenders policy for acceptable PITI. It has been included in a separate BKM to make it simple to find and change as well as for reuse purposes.

Decision Logic (Literal Expression)

Lender Acceptable PITI
Number

```
0.28
```

Credit Score Rating (Decision)

Description

This decision logic converts the borrower's Credit Score number to a text Lender Credit Score Rating. Here, the decision logic uses a unique hit-policy decision table to test the FICO score against specific ranges and returns "Bad", "Poor", "Fair", "Good" or "Excellent".

Question and Answers

Question	What is borrower's credit rating based on FICO score (Borrower.FICOScore)?
Allowed Answer	Excellent, Good, Fair, Poor, Bad

Decision Logic (Decision Table)

Credit Score Rating
Credit Score Rating
"Poor", "Bad", "Fair", "Good", "Excellent"

U	Credit Score.FICO	Credit Score Rating	Description
		"Poor", "Bad", "Fair", "Good", "Excellent"	
1	>= 750	"Excellent"	
2	[700..750)	"Good"	
3	[650..700)	"Fair"	
4	[600..650)	"Poor"	
5	< 600	"Bad"	

Back End Ratio (Decision)

Description

This decision logic is a Context with a boxed expression that calculates the Client DTI by invoking the DTI BKM function using two parameters, and then determines if the Back End Ratio is Sufficient or Insufficient based on the literal in the Lender Acceptable DTI BKM.

Decision Logic (Context)

Back End Ratio
Back End Ratio
"Insufficient", "Sufficient"

	DTI	
Client DTI	d	`Applicant Data.Monthly.Repayments + Applicant Data.Monthly.Expenses`
	i	`Applicant Data.Monthly.Income`

```
if Client DTI <= Lender Acceptable DTI()
then "Sufficient"
else "Insufficient"
```

Front End Ratio (Decision)

Description

This decision logic is a Context with a boxed expression that calculates the Client PITI by invoking the PITI BKM function using five parameters, and then determines if the Front End Ratio is Sufficient or Insufficient based on the literal in the Lender Acceptable PITI BKM.

Decision Logic (Context)

Front End Ratio
Front End Ratio
"Sufficient", "Insufficient"

	PITI	
Client PITI	principle	`Requested Product.Amount/12`
	interest	`Requested Product.Rate`
	tax	`Applicant Data.Monthly.Tax*12`
	insurance	`Applicant Data.Monthly.Insurance*12`
	income	`Applicant Data.Monthly.Income`

```
if Client PITI <= Lender Acceptable PITI()
then "Sufficient"
else "Insufficient"
```

DTI (Business Knowledge Model)

Description

This Business Knowledge Model (BKM) is a FEEL called Function (Expression) invoked from the Back End Ratio decision logic to calculate the Debt-to-Income (DTI) ratio. The data used is from the Applicant Data input. It is a very common calculation so it has been created in a BKM for quick and easy reuse.

Decision Logic (Function - Expression)

DTI *Number*	
F	(d,i)

```
d/i
```

PITI (Business Knowledge Model)

Description

This Business Knowledge Model (BKM) is a FEEL called Function (Expression) invoked from the Front End Ratio decision logic to calculate the Principal, Interest, Taxes and Insurance to income (PITI) ratio. It is a very common calculation so it has been created in a BKM for quick and easy reuse.

Decision Logic (Function - Expression)

PITI *Number*	
F	(principle,interest,tax,insurance,income)

```
(principle+interest+tax+insurance)/income
```

Applicant Data (Input Data)

Description

This is the information collected from the loan applicant:

Applicant Data	1	Age	Number		
	2	Marital Status	Marital Status *"M", "D", "S"*		
	3	Employment Status	Text *"Unemployed", "Employed", "Self-employed", "Student"*		
	4	Existing Customer	Boolean		
	5	Monthly		1	Income	Number
				2	Repayments	Number
				3	Expenses	Number
				4	Tax	Number
				5	Insurance	Number

Requested Product (Input Data)

Description

This is the data collected from the applicant about the profile of the loan they want:

Requested Product	1	Type	Product Type *"Standard Loan", "Special Loan"*
	2	Rate	Number
	3	Term	Number
	4	Amount	Number

Credit Score (Input Data)

Description

This is the externally obtained applicant FICO credit score.

Credit Score	1	FICO	Number

DMN Modeler Report

Routing Alternative #1

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Routing Alternative #1

Overview

DETERMINE ROUTING (ROUTING DECISION SERVICE RE-IMAGINED Alternative #1)

This report, like all the others in the Trisotech submission, was generated from a single click of a menu-ribbon button on the Import-Export Menu of the DMN Modeler. This export to both Word and and HTML format is available as a standard feature of the modeler.

The same basic approach was taken for the new implementation of the routing decision model. In this case, we took a slightly different approach to the affordability determination to demonstrate the expressive power of FEEL Conformance Level 3.

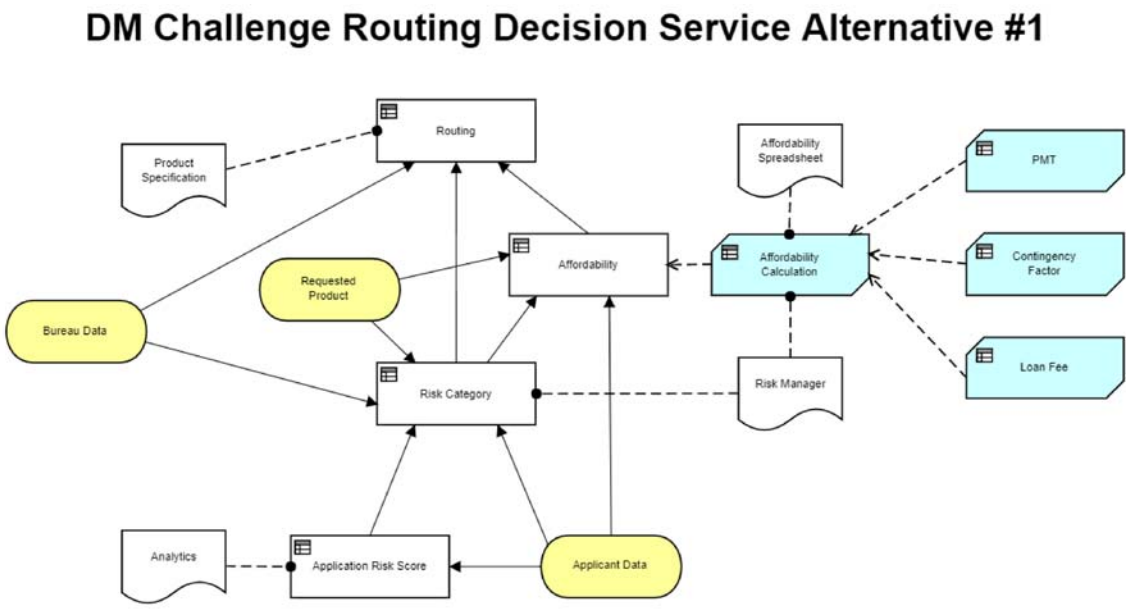
1. We have removed the superfluous use of boxed contexts solely for the sake of improving readability. Using BKMs frequently gives us this readability.

2. The core decision tables contain logic that frequently changes and are easily accessible for modification when required. We believe the readability and manageability goals are met quite well with this approach.

3. The Affordability calculations have all been incorporated into boxed expressions – in this alternative the calculations are in boxed expressions which either call additional BKMs (PMT, Loan Fee, & Contingency Factor) containing common functions or evaluate variables directly in the boxed expression. The logic is presented in BKMs in a fashion that should be extremely clear to business analysts (loan officers in this case). The typical uses for BKMs include common, reusable decision logic and organization-specific variable data typically representing policy decisions (ranks, ratios, scoring ranges, etc.) associated with separation of concerns. This makes it very easy for the business user to add additional loan types or change the fees associated with them.
   Also important is the idea that these are logic pieces that would typically be reused numerous times in a lending process so representation as a Business Knowledge Model is the best approach.

Decide Routing DRD

Decision Requirement Diagram



Elements

Routing (Decision)

Description

This decision results in a text sting of "Accept", "Decline" or "Refer" based on the priority hit policy in the decision table. If the applicant can not afford the loan or has had a bankruptcy, they will be declined. High risk scores or low credit scores for the applicant send the application through the referral process (See Loan Origination Business Process Management (BPMN) diagram as part of this submission.) If none of these conditions exist, the application will be deemed accepted.

Decision Logic (Decision Table)

Routing
Text

P	Risk Category	Affordability	Bureau Data.Bankrupt	Bureau Data.Credit Score	Routing	Description
	"High", "Medium", "Low", "Very Low", "Decline"				*"Decline", "Refer", "Accept"*	
1	-	false	-	-	"Decline"	

2	-	-	true	-	"Decline"	
3	"High"	-	-	-	"Refer"	
4	-	-	-	<580	"Refer"	
5	-	-	-	-	"Accept"	

Affordability Spreadsheet (Knowledge Source)

Product Specification (Knowledge Source)

Description

This represents the institution's inventory of loan products.

PMT (Business Knowledge Model)

Description

This function computes a Payment (PMT) on a loan and shows the power of creating common calculations and other decision logic in callable functions that can be reused throughout the organization's decisions.

It uses as input parameters loan amount, interest rate and term of loan. It returns a monthly payment.

Since this is a very common calculation in the lending business, this BKM will likely be reused in many decisions.

Decision Logic (Function - Expression)

PMT *Number*		
F	(p,r,n)	

```
(p*r/12)/(1-(1+r/12)**(0-n))
```

Affordability (Decision)

Description

Invokes Affordability Decision calculation defined in the input BKM "Affordability Calculation"

Decision Logic (Invocation)

Affordability *Boolean*	
Affordability Calculation	
Requested Product	Requested Product
Applicant Data	Applicant Data
Risk Category	Risk Category

Affordability Calculation (Business Knowledge Model)

Description

This boxed expression logic invokes common functions in BKMs (PMT, Loan Fee and Contingency Factor, calculates variables Required Monthly Installment and Monthly Disposable Income from FEEL expressions, and ends in a comparison expression that returns true or false.

Decision Logic (Function - Context)

Affordability Calculation *Boolean*		
(Applicant Data , Requested Product , Risk Category)		
Monthly Fee	Loan Fee	
	Loan Type	`Requested Product.Product Type`
Monthly Repayment	PMT	
	p	`Requested Product.Amount`
	r	`Requested Product.Rate`
	n	`Requested Product.Term`
Required Monthly Installment	`Monthly Fee + Monthly Repayment`	
Monthly Disposable Income	`Applicant Data.Monthly.Income - Required Monthly Installment`	
Credit Contingency Factor	Contingency Factor	
	Risk	`Risk Category`

```
if (Monthly Disposable Income * Credit Contingency Factor) > Required
Monthly Installment
then true
else false
```

Contingency Factor (Business Knowledge Model)

Description

This decision table is used to convert a Risk Category into a numeric Contingency Factor used by the Affordability Calculation.

Decision Logic (Decision Table)

Contingency Factor *Number*

U	Risk	Contingency Factor	Description
	"High", "Medium", "Low", "Very Low", "Decline"		
1	"High", "Decline"	0.6	
2	"Medium"	0.7	
3	"Low", "Very Low"	0.8	

Requested Product (Input Data)

Description

This is the data collected from the applicant about the profile of the loan they want:

Requested Product			
	1	Product Type	Text
	2	Rate	Number
	3	Term	Number
	4	Amount	Number

Bureau Data (Input Data)

Description

This is the data used by the pull from the credit bureau:

Bureau Data			
	1	Bankrupt	Boolean
	2	Credit Score	Number

Loan Fee (Business Knowledge Model)

Description

This decision table is used to determine the institution's loan fee amount based on the Loan type.

Decision Logic (Decision Table)

Loan Fee
Number

U	Loan Type	Loan Fee	Description
	"Standard Loan", "Special Loan"		
1	"Standard Loan"	20	
2	"Special Loan"	25	
3	not("Standard Loan","Special Loan")	0	

Risk Category (Decision)

Description

The decision logic for this decision is a unique-hit decision table that returns Risk Category and Credit Contingency Factor.

Decision Logic (Decision Table)

Risk Category
Risk Category
"High", "Medium", "Low", "Very Low", "Decline"

U	Applicant Data.Existing Customer	Application Risk Score	Bureau Data.Credit Score	Risk Category	Description
				"High", "Medium", "Low", "Very Low", "Decline"	
1	false	<120	<590	"High"	
2			[590..610]	"Medium"	
3			>610	"Low"	
4		[120..130]	<600	"High"	
5			[600..625]	"Medium"	
6			>625	"Low"	
7		>130	-	"Very Low"	
8	true	<=100	<580	"High"	
9			[580..600]	"Medium"	
10			>600	"Low"	
11		>100	<590	"High"	
12			[590..615]	"Medium"	
13			>615	"Low"	

Risk Manager (Knowledge Source)

Description

Risk Category and Credit Contingency Factor are based on Lenders research and analysis from Risk Manager.

Analytics (Knowledge Source)

Description

The source of this knowledge is fundamental research into the factors that determine how risky a loan is based on certain loan-applicant personal data. In this case, Age, Marital Status and Employment Status.

Application Risk Score (Decision)

Description

The decision logic for this decision is a decision table using a collection sum aggregation method. (Every row that is true contributes the result value (Application Risk Score column value) to a total sum representing the value returned for the decision.)

Decision Logic (Decision Table)

Application Risk Score
Number

C+	Applicant Data.Age	Applicant Data.Marital Status	Applicant Data.Employment Status	Application Risk Score	Description
	(18..120)	*"S", "M"*	*"Unemployed", "Employed", "Self-Employed", "Student"*		
1	[18..21]	-	-	32	
2	[22..25]	-	-	35	
3	[26..35]	-	-	40	
4	[36..49]	-	-	43	
5	>=50	-	-	48	
6	-	"S"	-	25	
7	-	"M"	-	45	
8	-	-	"Unemployed"	15	
9	-	-	"Student"	18	
10	-	-	"Employed"	45	
11	-	-	"Self-Employed"	36	

Applicant Data (Input Data)

Description

This is the applicant data acquired in the DM Origin BPMN activity Collect Application Data.

Applicant Data	1	Age	Number *(18..120)*		
	2	Marital Status	Text *"S", "M"*		
	3	Employment Status	Text *"Unemployed", "Employed", "Self-Employed", "Student"*		
	4	Monthly	1	Income	Number
			2	Repayments	Number
			3	Expenses	Number
	5	Existing Customer	Boolean		

DMN Modeler Report

Routing Alternative #2

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By: Brian Stucky, Goerge Barlow, Denis Gagne

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Routing Alternative #2

Overview

DETERMINE ROUTING (ROUTING DECISION SERVICE RE-IMAGINED Alternative #2)

This report, like all the others in the Trisotech submission, was generated from a single click of a menu-ribbon button on the Import-Export Menu of the DMN Modeler. This export to both Word and and HTML format is available as a standard feature of the modeler.

The same basic approach was taken for the new implementation of the routing decision model. In this case, we took a slightly different approach to the affordability determination to demonstrate the expressive power of Conformance Level 3. In this alternative Routing we show how the Affordability decision can be included in a single context decision using boxed expressions.

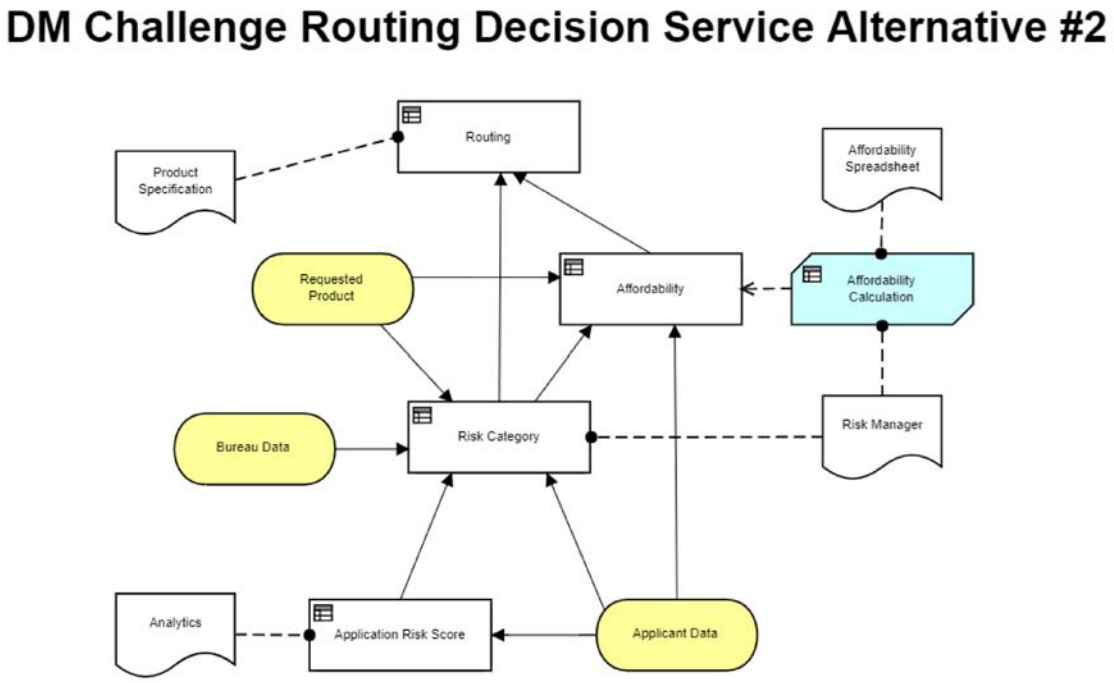
1. We have removed the superfluous use of boxed contexts solely for the sake of improving readability. Using BKMs frequently gives us this readability.

2. The core decision tables contain that logic most frequently changed and it is presented in a fashion that should be extremely clear to business analysts (loan officers in this case). In this model, we left the Contingency Factor amounts in a decision table but it was included in the Risk Category table. We believe the readability and manageability goals are still met with this approach.

3. The Affordability calculations have also all been incorporated into a boxed function – this time all are included in a single BKM (different from Alternative #1). Again, these calculations (disposable income, monthly loan payment, etc) do not change so we're comfortable with the arithmetic expression representation. We have included the loan fees as a decision table within the BKM. This makes it very easy for the business user to add additional loan types or change the fees associated with them. Most importantly, this is a piece of logic that might frequently be reused in a lending process so representation as a Business Knowledge Model is the best approach here. See Alternative #1 for an even more detailed breakout of reusable functions, etc.

Decide Routing DRD

Decision Requirement Diagram



Elements

Routing (Decision)

Description

This decision results in a text sting of "Accept", "Decline" or "Refer" based on the priority hit policy in the decision table. If the applicant can not afford the loan or has had a bankruptcy, they will be declined. High risk scores or low credit scores for the applicant send the application through the referral process (See Loan Origination Business Process Management (BPMN) diagram as part of this submission.) If none of these conditions exist, the application will be deemed accepted.

Decision Logic (Decision Table)

Routing
Text

P	Risk Category.Risk Category	Affordability	Bureau Data.Bankrupt	Bureau Data.Credit Score	Routing	Description
	"High", "Medium", "Low", "Very Low", "Decline"				*"Decline", "Refer", "Accept"*	

1	-	false	-	-	"Decline"	
2	-	-	true	-	"Decline"	
3	"High"	-	-	-	"Refer"	
4	-	-	-	<580	"Refer"	
5	-	-	-	-	"Accept"	

Affordability Spreadsheet (Knowledge Source)

Product Specification (Knowledge Source)

Description

This represents the institution's inventory of loan products.

Requested Product (Input Data)

Description

This is the data collected from the applicant about the profile of the loan they want:

Requested Product			
	1	Product Type	Text
	2	Rate	Number
	3	Term	Number
	4	Amount	Number

Affordability (Decision)

Description

Invokes Affordability Decision calculation defined in the input BKM "Affordability Calculation"

Decision Logic (Invocation)

Affordability *Boolean*	
Affordability Calculation	
Requested Product	`Requested Product`
Applicant Data	`Applicant Data`
Bureau Risk Category	`Risk Category`

Affordability Calculation (Business Knowledge Model)

Description

This BKM calculates the affordability of the requested loan and returns a Boolean (true or false) as the result of the calculation. This alternative calculates the Affordability in a single boxed expression logic. Here we see the power of boxed expressions which in this case include a decision table as well as Level 3 FEEL expressions to calculate intermediate variables for the Affordability expression calculation.

The BKM decision logic is

Decision Logic (Function - Context)

Affordability Calculation
Boolean

(Requested Product , Applicant Data , Bureau Risk Category)

U	Requested Product.Product Type	Monthly Fee	Description
1	"Standard Loan"	20.00	
2	"Special Loan"	25.00	
3	not("Standard Loan","Special Loan")	0	

Monthly Repayment	`(Requested Product.Amount * Requested Product.Rate / 12) / (1 - (1 + Requested Product.Rate / 12) ** (0 - Requested Product.Term))`
Required Monthly Installment	`Monthly Fee + Monthly Repayment`
Disposable Income	`Applicant Data.Monthly.Income - (Applicant Data.Monthly.Repayments + Applicant Data.Monthly.Expenses)`
Affordability	`if (Disposable Income * Bureau Risk Category.Credit Contingency Factor) > Required Monthly Installment then true else false`

`Affordability`

Bureau Data (Input Data)

Description

This is the data used by the pull from the credit bureau:

Bureau Data	1	Bankrupt	Boolean
	2	Credit Score	Number

Risk Category (Decision)

Description

The decision logic for this decision is a unique-hit decision table that returns Risk Category and Credit Contingency Factor.

Decision Logic (Decision Table)

Risk Category
Bureau Risk Category

U	Applicant Data.Existing Customer	Application Risk Score	Bureau Data.Credit Score	Risk Category		Description
				Risk Category	Credit Contingency Factor	
				"High", "Medium", "Low", "Very Low", "Decline"		
1	false	<120	<590	"High"	0.6	
2			[590..610]	"Medium"	0.7	
3			>610	"Low"	0.8	
4		[120..130]	<600	"High"	0.6	
5			[600..625]	"Medium"	0.7	
6			>625	"Low"	0.8	
7		>130	-	"Very Low"	0.8	
8	true	<=100	<580	"High"	0.6	
9			[580..600]	"Medium"	0.7	
10			>600	"Low"	0.8	
11		>100	<590	"High"	0.6	
12			[590..615]	"Medium"	0.7	
13			>615	"Low"	0.8	

Risk Manager (Knowledge Source)

Description

Risk Category and Credit Contingency Factor are based on Lenders research and analysis from Risk Manager.

Analytics (Knowledge Source)

Description

The source of this knowledge is fundamental research into the factors that determine how risky a loan is based on certain loan-applicant personal data. In this case, Age, Marital Status and Employment Status.

Application Risk Score (Decision)

Description

The decision logic for this decision is a decision table using a collection sum aggregation method. (Every row that is true contributes the result value (Application Risk Score column value) to a total sum representing the value returned for the decision.)

Decision Logic (Decision Table)

Application Risk Score
Number

C+	Applicant Data.Age	Applicant Data.Marital Status	Applicant Data.Employment Status	Application Risk Score	Description
	(18..120)	*"S", "M"*	*"Unemployed", "Employed", "Self-Employed", "Student"*		
1	[18..21]	-	-	32	
2	[22..25]	-	-	35	
3	[26..35]	-	-	40	
4	[36..49]	-	-	43	
5	>=50	-	-	48	
6	-	"S"	-	25	
7	-	"M"	-	45	
8	-	-	"Unemployed"	15	
9	-	-	"Student"	18	
10	-	-	"Employed"	45	
11	-	-	"Self-Employed"	36	

Applicant Data (Input Data)

Description

This is the applicant data acquired in the DM Origin BPMN activity Collect Application Data.

Applicant Data	1	Age	Number *(18..120)*		
	2	Marital Status	Text *"S", "M"*		
	3	Employment Status	Text *"Unemployed", "Employed", "Self-Employed", "Student"*		
	4	Monthly	1	Income	Number
			2	Repayments	Number
			3	Expenses	Number
	5	Existing Customer	Boolean		