



DMN Modeler Report
DM Community March Challenge

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Table of Contents

- DM Community March Challenge..... 3
 - Overview 3
 - Scope Definition 3
 - Desired Outcomes..... 4
- Solution 1 4
 - Decision Requirement Diagram 4
 - Elements 5
- Solution 2 11
 - Decision Requirement Diagram 11
 - Elements 11
- Solution 3 13
 - Decision Requirement Diagram 13
 - Elements 13

DM Community March Challenge

Overview

The Decision Management Community provides resources for DM practitioners, listing tools, news, providing examples and also giving a monthly challenge.

As a vendor that always seek improvement, we took the March challenge using Trisotech DMN Modeler.

Scope Definition

The March challenge is to create a decision model capable to decide if a ship can enter a Dutch port on a certain date. The rules for this challenge are inspired by the international Ship and Port Facility Security Code.

They were originally developed for The Game Of Rules, a publication of the Business Rules Platform Netherlands. The authors: Silvie Spreeuwenberg, LibRT; Charlotte Bouvy, Oelan; Martijn Zoet, Zuyd University of Applied Sciences. The rule set is not intended to be complete for all possible cases.

Here are the Port Clearance Rules:

Rule #1. The hold of a ship must be considered clean if the hold does not contain remainders of cargo.

Rule #2. An unloaded ship may only enter a Dutch port if the ship complies with the requirements of the Inspection for unloaded ships.

Rule #3. A ship must comply with the requirements of the Inspection for unloaded ships if the ship complies with all of the following: a) the ship meets the safety requirements for unloaded ships; b) the ship has a certificate of registry that is valid.

Rule #4. A ship must be categorized as large if the total length of the ship is at least 80 meters.

Rule #5. A ship's hold contains remainders of cargo if the residual cargo measurement is higher than 0.5 mg dry weight per cm².

Rule #6. A ship only meets the safety requirements for unloaded ships if the ship complies with at least one of the following: a) the ship meets the safety requirements for small unloaded ships; b) the ship meets the safety requirements for large unloaded ships.

Rule #7. A ship only meets the safety requirements for large unloaded ships if the ship complies with all of the following: a) the ship is categorized as large; b) the hold of the ship is clean; c) the hold of the ship is double hulled.

Rule #8. A ship only meets the safety requirements for small unloaded ships if the ship complies with all of the following: a) the ship is categorized as small; b) the hold of the ship is clean.

Rule #9. A ship must be categorized as small if the total length of the ship is less than 80 meters.

Rule #10. A ship's certificate of registry must be considered valid if the date up to which the registration is valid of the certificate of registry is after the current date.

Desired Outcomes

Find the best possible DMN solution to determine if a ship can enter a Dutch port on a certain date.

Solution 1

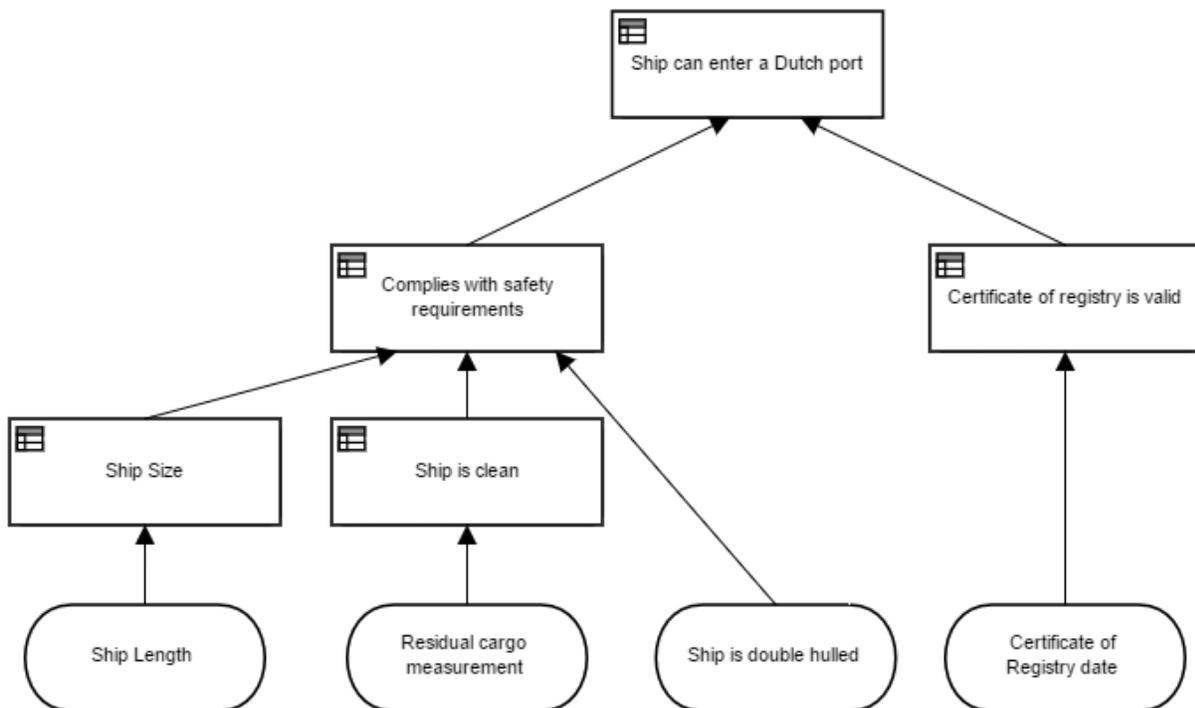
Description

This first solution uses multiple Unique Hit Policy decision tables and it follows the rules listing closely. Some rules are grouped together in order to provide easy to read decision tables. The disadvantage of Unique Hit Policy decision table is that it requires to explicitly detail all possible combinations in each table, which creates larger decision tables.

After doing an overview of the rules we identified 4 Input Data:

- From Rule #4: Total length of the ship (Ship Length)
- From Rule #5: Residual cargo measurement (Residual cargo measurement)
- From Rule #7: If the hold of the ship is double hulled or not? (Ship is double hulled)
- From Rule #10: Date up to which the registration is valid (Certificate of Registry date)

Decision Requirement Diagram



Elements

Ship can enter a Dutch port (Decision)

Description

This decision table is the top (final) decision that represents rule #2 which depends on rule #3 a and b. The result for rule 3a is taken for the *Complies with safety requirements* decision table and the result of rule 3b depends on the *Certificate of registry is valid* decision table.

Rule #2. An unloaded ship may only enter a Dutch port if the ship complies with the requirements of the Inspection for unloaded ships.

Rule #3. A ship must comply with the requirements of the Inspection for unloaded ships if the ship complies with all of the following:

- a) the ship meets the safety requirements for unloaded ships;
- b) the ship has a certificate of registry that is valid.

Reading this decision table, we can see that only the rule on row #1 will allow the ship to enter.

Question and Answers

Question	Can the ship enter a Dutch port on a certain date?
Allowed Answer	Yes (true) or No (false)

Decision Logic (Decision Table)

Ship can enter a Dutch port				
U	Complies with safety requirements	Certificate of registry valid	Ship can enter a Dutch port	Description
	<i>Boolean true, false</i>	<i>Boolean true, false</i>	<i>Boolean true, false</i>	
1	true	true	true	
2		false	false	
3	false	true		

Complies with safety requirements (Decision)

Description

To simplify the decisions, Small and Large safety requirements have been grouped together in this decision table which covers rule #6, #7 and #8. The first part of the decision table covers rule #8 (which is the details of rule #6a) while the second part covers rule #7 (which is the details of rule #6b). This decision table uses the outputs of *Ship Size* and *Ship is clean* decision tables.

Rule #6. A ship only meets the safety requirements for unloaded ships if the ship complies with at least one of the following:

- a) the ship meets the safety requirements for small unloaded ships;
- b) the ship meets the safety requirements for large unloaded ships.

Rule #7. A ship only meets the safety requirements for large unloaded ships if the ship complies with all of the following:

- a) the ship is categorized as large;
- b) the hold of the ship is clean;
- c) the hold of the ship is double hulled.

Rule #8. A ship only meets the safety requirements for small unloaded ships if the ship complies with all of the following:

- a) the ship is categorized as small;
- b) the hold of the ship is clean.

Question and Answers

Question	Does the ship comply with the safety requirements ?
Allowed Answer	Yes (true) or No (false)

Decision Logic (Decision Table)

Complies with safety requirements

U	Ship Size	Ship is clean	Ship is double hulled	Complies with safety requirements	Description
	<i>Collection [Small, Large]</i>	<i>Boolean true, false</i>	<i>Boolean true, false</i>	<i>Boolean true, false</i>	
1	Small	true	-	true	
2		false		false	
3	Large	true	true	true	
4			false	false	
5		false	true		false
6			false		

Certificate of registry is valid (Decision)

Description

This decision table is used to determine if the certificate of registry is valid. It covers rule #10.

Rule #10. A ship's certificate of registry must be considered valid if the date up to which the registration is valid of the certificate of registry is after the current date.

Now() is a function that has been added to the default S-FEEL semantic by our partner Idiom to allow specifying condition related to the current time.

Question and Answers

Question	Is the certificate of registry presently valid ?
Allowed Answer	Yes (true) or No (false)

Decision Logic (Decision Table)

Certificate of registry valid			
U	Certificate of Registry date	Certificate of registry valid	Description
	<i>Date</i>	<i>Boolean true, false</i>	
1	<= Now()	false	
2	> Now()	true	

Ship Size (Decision)

Description

This decision table is used to categorized the Ship following rules #4 et #9

Rule #4. A ship must be categorized as large if the total length of the ship is at least 80 meters.

Rule #9. A ship must be categorized as small if the total length of the ship is less than 80 meters.

Question and Answers

Question	What size category is the ship in ?
Allowed Answer	Small or Large

Decision Logic (Decision Table)

Ship Size			
U	Ship Length	Ship Size	Description
	<i>Number</i>	<i>Collection [Small, Large]</i>	
1	<80	Small	Length is in meters

2	>=80	Large	
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Ship is clean (Decision)

Description

Cleanliness of the ship is described in rule #1 and #5 that have been combined together.

Rule #1. The hold of a ship must be considered clean if the hold does not contain remainders of cargo.

Rule #5. A ship's hold contains remainders of cargo if the residual cargo measurement is higher than 0.5 mg dry weight per cm².

Question and Answers

Question	Is the ship clean ?
Allowed Answer	Yes (true) or No (false)

Decision Logic (Decision Table)

Ship is clean			
U	Residual cargo measurement	Ship is clean	Description
	<i>Number</i>	<i>Boolean true, false</i>	
1	<=0,5	true	
2	>0,5	false	

Ship Length (Input Data)

Description

Total ship length of the boat, in meters.

Residual cargo measurement (Input Data)

Description

The residual cargo measurement is in mg dry weight per cm².

Certificate of Registry date (Input Data)

Ship is double hulled (Input Data)

Description

A boolean value telling if the ship is double hulled or not.

Solution 2

Description

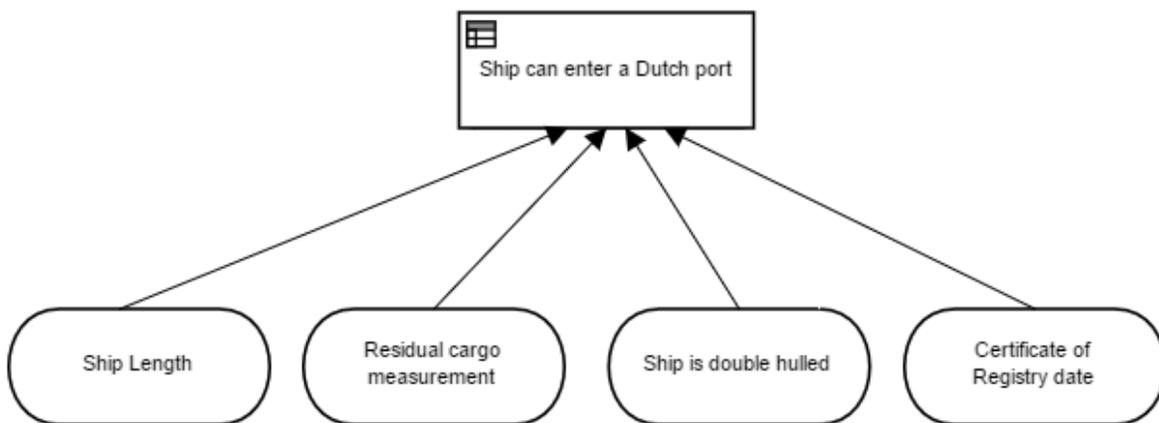
The second solution aims for simplicity. It is really easy once you've drawn all the possible tables to see which conditions actually allows a ship to enter and there is only 2 of them depending on the size of the ship. Any other combination prevents the ship to enter.

This table is really easy to use, but you lose the links to the Safety Requirements and the Requirements of the Inspection.

Again doing an overview of the rules we identified 4 Input Data:

- From Rule #4: Total length of the ship (Ship Length)
- From Rule #5: Residual cargo measurement (Residual cargo measurement)
- From Rule #7: If the hold of the ship is double hulled or not? (Ship is double hulled)
- From Rule #10: Date up to which the registration is valid (Certificate of Registry date)

Decision Requirement Diagram



Elements

Ship can enter a Dutch port (Decision)

Description

Only a clean boat (which is determined by the residual cargo measurement) with a valid certificate can enter the port. Large boats have an additional condition that they must be double hulled. Any other combination means the ship cannot enter the port and will fall in the rule of the third row. The first hit policy ensures that rules on row 1 and row 2 will be picked first.

Now() is a function that has been added to the default S-FEEL semantic by our partner Idiom to allow specifying condition related to the current time.

Question and Answers

Question	Can the ship enter a Dutch port on a certain date?
Allowed Answer	Yes (true) or No (false)

Decision Logic (Decision Table)

Ship can enter a Dutch port						
F	Ship Length	Residual cargo measurement	Ship is double hulled	Certificate of Registry date	Ship can enter a Dutch port	Description
	<i>Number</i>	<i>Number</i>	<i>Boolean true, false</i>	<i>Date</i>	<i>Boolean true, false</i>	
1	<80	<0.5	-	> Now()	true	
2	>=80	<0.5	true	> Now()	true	
3	-	-	-	-	false	

Ship Length (Input Data)

Description

Total ship length of the boat, in meters.

Residual cargo measurement (Input Data)

Description

The residual cargo measurement is in mg dry weight per cm².

Certificate of Registry date (Input Data)

Ship is double hulled (Input Data)

Description

A boolean value telling if the ship is double hulled or not.

Solution 3

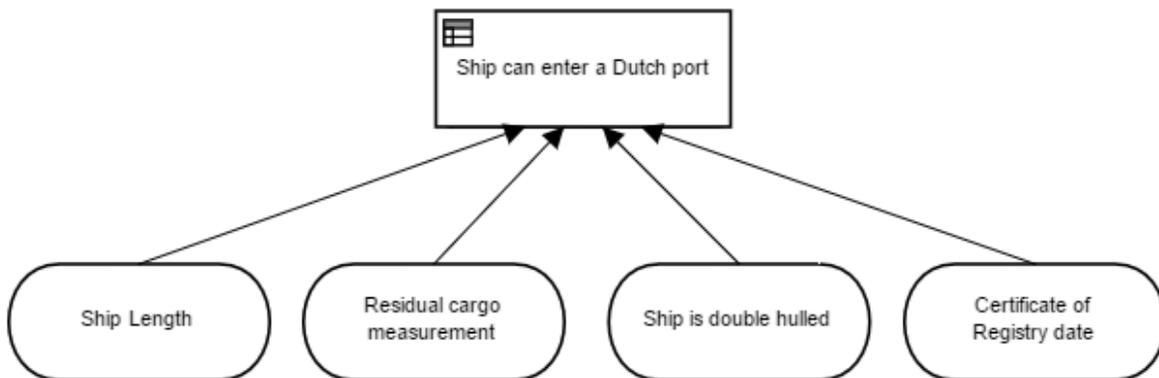
Description

For solution 3, it was decided to use another element of DMN decision logic: the boxed function. Based on the required inputs (Ship Size, Residual Cargo Size, Certificate date and isDoubleHulled), this function determines if the ship can enter the port. With the if then else format, this make it readable by a human and by a machine.

Again doing an overview of the rules we identified 4 Input Data:

- From Rule #4: Total length of the ship (Ship Length)
- From Rule #5: Residual cargo measurement (Residual cargo measurement)
- From Rule #7: If the hold of the ship is double hulled or not? (Ship is double hulled)
- From Rule #10: Date up to which the registration is valid (Certificate of Registry date)

Decision Requirement Diagram



Elements

Ship can enter a Dutch port (Decision)

Question and Answers

Question	Can the ship enter a Dutch port on a certain date?
Allowed Answer	Yes (true) or No (false)

Decision Logic (Boxed Function)

Ship can enter a Dutch port

F	(Ship Length, Ship is double hulled, Residual cargo measurement, Certificate of Registry date)
if Ship Length < 80 and Residual cargo measurement <0.5 and Certificate Date > Now() then true else if Ship Length >= 80 and Residual cargo measurement <0.5 and Certificate Date > Now() and Ship is double hulled then true else false	

Ship Length (Input Data)

Description

Total ship length of the boat, in meters.

Residual cargo measurement (Input Data)

Description

The residual cargo measurement is in mg dry weight per cm².

Certificate of Registry date (Input Data)

Ship is double hulled (Input Data)

Description

A boolean value telling if the ship is double hulled or not.

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