Meeting the Expectations with DMN and Constraint Solving: The Notary Case

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Agenda

• What’s interesting about notaries?
• Purpose of the system
• Towards the ideal system
• Wrap up and lessons learned
The notary case: registration rights
The notary case : registration rights

Following the rules

Clear – Consistent - Fixed

Large added value
Non-intrusive

Interactive

Explainable

Optimal solution

Requirements
Approach

DMN
- OpenRules
- Analysis

Knowledge Base
- IDP
- First Order Logic

Interactive Configuration
- Incorporate Inferences
DMN: method

https://www.omg.org/spec/DMN/About-DMN/
DMN in practice

Decision Logic
Elicitation

IF…
THEN…
## OpenRules implementation

### DecisionTable ApplicableTaxRate

<table>
<thead>
<tr>
<th>Location RealEstate</th>
<th>Type RealEstate</th>
<th>TaxRate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brussels</td>
<td>Social housing</td>
<td>1.5</td>
</tr>
<tr>
<td>Brussels</td>
<td>Other Housing</td>
<td>12.5</td>
</tr>
<tr>
<td>Flanders</td>
<td>Social housing</td>
<td>1.5</td>
</tr>
<tr>
<td>Flanders</td>
<td>Other Housing</td>
<td>10.0</td>
</tr>
<tr>
<td>Wallonia</td>
<td>Social housing</td>
<td>0.0</td>
</tr>
<tr>
<td>Wallonia</td>
<td>Modest housing</td>
<td>6.0</td>
</tr>
<tr>
<td>Wallonia</td>
<td>Other Housing</td>
<td>12.5</td>
</tr>
</tbody>
</table>

### DecisionTable Abattement

<table>
<thead>
<tr>
<th>BuyerType</th>
<th>Domicile</th>
<th>CleanBuy</th>
<th>OtherProperties</th>
<th>Destination</th>
<th>Abattement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Person</td>
<td>Y</td>
<td>N</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Other legal form</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- NoHabitation
- Habitation
- SocialHabitation

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Decision Main: start
Assign: PrincipleMeneembaar = 0 [0]
Assign: LektaLENrechten = 0 [0]
Assign: Maximum = 0 [0]
Assign: MeneembaarheidKoper = 0 [0]
Assign: totalMIN = 0 [0]
Decision Main: iterates
Iterate over array Kopers using rules BerekenMaxima
Assign: PrincipleMeneembaar = 0 [0]
Assign: Maximum = 0 [0]
Iterate over array Kopers using rules BerekenMinimum
Iterate over array Kopers using rules BerekenTotaal
Decision Main: Print Koper
Meneembaar(id=0) {
  id=0
  kopers={
    [0]-koper(id=2) {
      aandeelkoper=58
      aandeelkoper=68
      naam=Jan
      registratieRecht=20000
    }
  }
  maximum=0
  meneembaarheidKoper=0
  principleMeneembaar=0
  totaalrechten=0
}

Decision Main: Registratiekosten onder abattement
Assign: Registratiekosten= (Verkoopwaarde - Abattement - Bijlatting - Renovatie) * HefFing/100
Decision Main: Registratiekosten met meneembaarheid
Assign: Registratiekosten=meneembaarheid - ((Verkoopwaarde - RenovatieAbattement) * HefFing/100)
Decision Main: #rules
Gebruik van abattement en meneembaarheid zijn gelijk [produced by BepaalAdvies]
Decision Main: Decision Output
OUTPUT: Response(id=0) {
  abattement=0
  bijlatting=0
  heffings=3
  meneembaarheid=666
  registratiekosten=10000
  registratiekosten=20000
  registratiekosten=30000
  registratiekosten=40000
  renovatieAbattement=0
}

Decision has been finalized
Validating results for the test <Test 1>
MISMATCH: variable 'meneembaarheidKoper' has value '0' while '15000' was expected
Test 1 was unsuccessful
1 test(s) out of 0 Failed!
DMN: evaluation

Correct solution

Readability

Easy modeling

Interactivity
Additional inferences with IDP
IDP: creating the code

{ 
  ApplicableRate = 1 ← HasRegistrationType = SocialDwelling ∧ HasLocation = Flanders. 
  ApplicableRate = 7 ← HasRegistrationType = FamilyDwelling ∧ HasLocation = Flanders. 
  ApplicableRate = 10 ← HasRegistrationType ≠ SocialDwelling ∧ HasRegistrationType ≠ FamilyDwelling ∧ HasLocation = Flanders. 
  ApplicableRate = 12 ← HasLocation = Wallonia V HasLocation = Brussel. 
}
Additional inferences with IDP
## Interactive Decision Enactment

### Configuration
- **Has Location**
  - Flanders
  - Wallonia
  - Brussels

- **Has Registration Type**
  - Family Dwelling
  - Social Dwelling
  - Other

### Decision Parameters
- **Applicable Rate**
  - 1
  - 7
  - 10
  - 12

- **Buyer Type**
  - Natural Person
  - Corporation
  - Mixed

- **Price**
  - 180
  - 190
  - 200
  - 210
  - 220
  - 230

- **Municipality**
  - Other Municipality
  - Antwerp
  - Ghent

- **Seller**
  - Licensed
  - Unlicensed

- **Purpose**
  - Social Habit
  - Resale
  - Habitation
  - Rental
Non-intrusive
Interactive
Requirements
Optimal solution
Expanding the inferences

Single solution calculation

Propagation
Optimization
Model expansion

Propagation
Optimization
Model expansion
Explanation
Relevance
Relevance

Registration Type = SocialDwelling

Licenced Seller = Licenced &

Purpose of the real estate = SocialHabit
Explanation
Lessons learned I

Ontology / glossary is important

Talk the same language?

DMN as intermediate model
Lessons learned II

Untapped potential of DMN

Fruitful combination of DMN and IDP

The higher the interactivity, the better
References


• Images / Pictures:
  • Pictures from pixabay
  • Exponential by auttapol from the Noun Project
  • Glass Wall by Huang An Sheng from the Noun Project
  • Correct by Oliver Kittler from the Noun Project
  • Best by priyanka from the Noun Project
  • Glasses by Lyhn from the Noun Project
  • Medal by Yazmin Alanis from the Noun Project