Manually created expert model (Ground-truth)
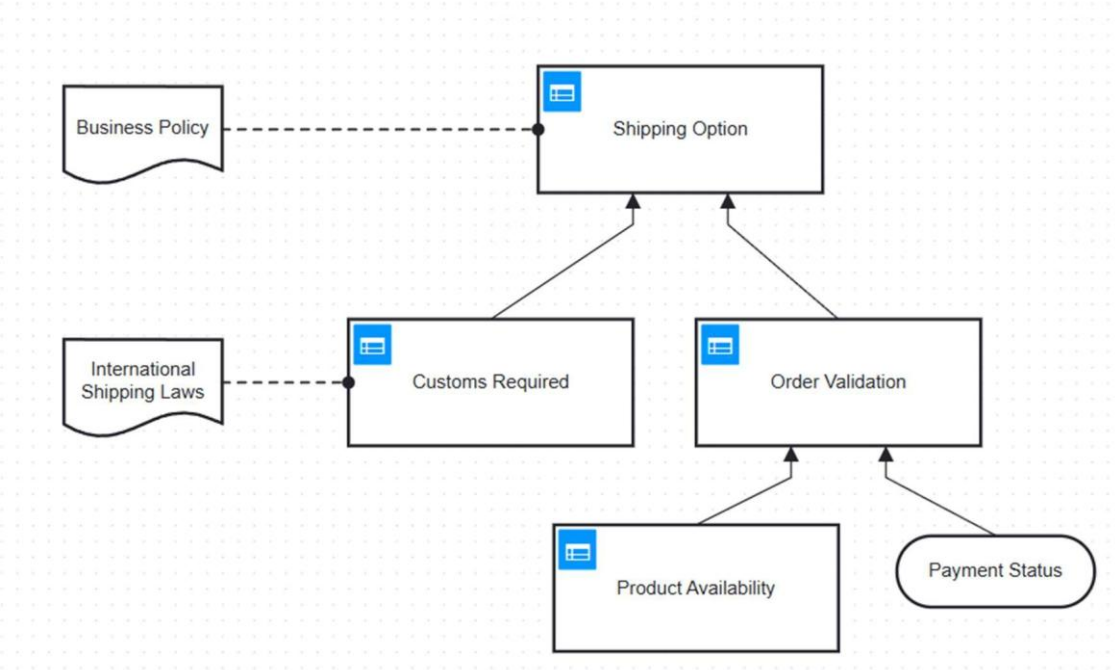
DRD

Decision Tables

Product Availability | Hit policy: Unique

	When Requested Quantity number	Then Available boolean	Annotations
1	<= Order.stockLevel	true	The requested quantity is available.
2	> Order.stockLevel	false	The requested quantity is not available.
+	-		

Order Validation | Hit policy: Unique

	When Available boolean	And Payment Status boolean	Then Valid Order boolean	Annotations
1	true	true	true	If available and payment valid, order is valid.
2	true	false	false	If available but payment invalid, order is not valid.
3	false	-	false	If not available, order is not valid (payment irrelevant).
+	-	-		

Customs Required

	When		Then		Annotations
	Destination Type ➕		**Customs** ➕		
	string		boolean		
⠿ 1	"Domestic"		false		Customs do not apply on domestic orders.
2	"International"		true		Customs apply on international orders.
➕	-				

Hit policy: Unique

Shipping Option

Hit policy: Unique

	When	And	And	Then	Annotations
	Valid Order	**Customs**	**Delivery Speed** ➕	**Shipping Option** ➕	
	boolean	boolean	string	string	
1	true	true	"Standard"	"Standard Shipment"	
2	true	false	"Standard"	"Standard Shipment"	
3	true	false	"Express"	"Express Shipment"	
4	true	true	"Express"	"Not Provided"	
5	false	-	-	""	
➕	-	-	-		

XML

```xml
<?xml version="1.0" encoding="UTF-8"?>

<definitions xmlns="https://www.omg.org/spec/DMN/20191111/MODEL/"
xmlns:dmndi="https://www.omg.org/spec/DMN/20191111/DMNDI/"
xmlns:dc="http://www.omg.org/spec/DMN/20180521/DC/"
xmlns:biodi="http://bpmn.io/schema/dmn/biodi/2.0"
xmlns:di="http://www.omg.org/spec/DMN/20180521/DI/"    id="definitions"
name="OnlineOrderFulfillment"
     namespace="http://camunda.org/schema/1.0/dmn"    exporter="Camunda
Modeler"    exporterVersion="5.40.0">


<!-- ====== Inputs ====== -->

<inputData id="OrderInput" name="Order">

  <variable name="Order" typeRef="any"/>

</inputData>


<inputData id="PaymentStatus" name="Payment Status">

  <variable name="PaymentStatus" typeRef="boolean"/>

</inputData>


<!-- ====== Decisions ====== -->
```

```xml
<!-- 1) Product Availability -->
<decision id="ProductAvailability" name="Product Availability">
  <variable name="Available" typeRef="boolean"/>
  <informationRequirement>
    <requiredInput href="#OrderInput"/>
  </informationRequirement>
  <decisionTable id="dt_availability">
    <input id="Availability_Input_Quantity" label="Requested Quantity" biodi:width="192">
      <inputExpression id="Availability_InputExpr_Quantity" typeRef="number">
        <text>Order.requestedQuantity</text>
      </inputExpression>
    </input>
    <output id="Availability_Output" label="Available" name="Available" typeRef="boolean"/>
    <rule id="Availability_Rule_Available">
      <description>The requested quantity is available.</description>
      <inputEntry id="Availability_InputEntry_Le">
        <text>&lt;= Order.stockLevel</text>
      </inputEntry>
      <outputEntry id="Availability_OutputEntry_True">
        <text>true</text>
      </outputEntry>
    </rule>
    <rule id="Availability_Rule_NotAvailable">
      <description>The requested quantity is not available.</description>
      <inputEntry id="Availability_InputEntry_Gt">
        <text>&gt; Order.stockLevel</text>
      </inputEntry>
      <outputEntry id="Availability_OutputEntry_False">
        <text>false</text>
      </outputEntry>
    </rule>
  </decisionTable>
</decision>


<!-- 2) Order Validation (Available + PaymentStatus -> ValidOrder) -->
<decision id="OrderValidation" name="Order Validation">
  <variable name="ValidOrder" typeRef="boolean"/>
  <informationRequirement id="IR_OrderValidation_Availability">
    <requiredDecision href="#ProductAvailability"/>
  </informationRequirement>
```

```xml
<informationRequirement id="IR_OrderValidation_Payment">
  <requiredInput href="#PaymentStatus"/>
</informationRequirement>
<decisionTable id="dt_order_validation">
  <input id="Validation_Input_Available" label="Available">
    <inputExpression id="Validation_InputExpr_Available" typeRef="boolean">
      <text>Available</text>
    </inputExpression>
  </input>
  <input id="Validation_Input_Payment" label="Payment Status">
    <inputExpression id="Validation_InputExpr_Payment" typeRef="boolean">
      <text>PaymentStatus</text>
    </inputExpression>
  </input>
  <output id="Validation_Output" label="Valid Order" name="ValidOrder" typeRef="boolean"/>
  <rule id="Validation_Rule_Valid">
    <description>If available and payment valid, order is valid.</description>
    <inputEntry id="Validation_InputEntry_Available_True">
      <text>true</text>
    </inputEntry>
    <inputEntry id="Validation_InputEntry_Payment_True">
      <text>true</text>
    </inputEntry>
    <outputEntry id="Validation_OutputEntry_True">
      <text>true</text>
    </outputEntry>
  </rule>
  <rule id="Validation_Rule_Invalid_Payment">
    <description>If available but payment invalid, order is not valid.</description>
    <inputEntry id="Validation_InputEntry_Available_True2">
      <text>true</text>
    </inputEntry>
    <inputEntry id="Validation_InputEntry_Payment_False">
      <text>false</text>
    </inputEntry>
    <outputEntry id="Validation_OutputEntry_False1">
      <text>false</text>
    </outputEntry>
  </rule>
  <rule id="Validation_Rule_Invalid_NotAvailable">
```

```xml
      <description>If not available, order is not valid (payment irrelevant).</description>
      <inputEntry id="Validation_InputEntry_Available_False">
        <text>false</text>
      </inputEntry>
      <inputEntry id="Validation_InputEntry_Payment_Any">
        <text>-</text>
      </inputEntry>
      <outputEntry id="Validation_OutputEntry_False2">
        <text>false</text>
      </outputEntry>
    </rule>
  </decisionTable>
</decision>


<!-- 3) Customs Required (Order.destinationType -> Customs: boolean) -->
<decision id="CustomsRequired" name="Customs Required">
  <variable name="Customs" typeRef="boolean"/>
  <informationRequirement id="IR_Customs_Order">
    <requiredInput href="#OrderInput"/>
  </informationRequirement>
  <!-- authorityRequirement must be nested inside the decision -->
  <authorityRequirement id="AR_Customs_Laws">
    <requiredAuthority href="#KnowledgeSource_InternationalLaws"/>
  </authorityRequirement>
  <decisionTable id="dt_customs_required">
    <input id="Customs_Input_DestinationType" label="Destination Type">
      <inputExpression id="Customs_InputExpr_DestinationType" typeRef="string">
        <text>Order.destinationType</text>
      </inputExpression>
    </input>
    <output id="Customs_Output" label="Customs" name="Customs" typeRef="boolean"/>
    <rule id="Customs_Rule_Domestic">
      <description>Customs do not apply on domestic orders.</description>
      <inputEntry id="Customs_InputEntry_Domestic">
        <text>"Domestic"</text>
      </inputEntry>
      <outputEntry id="Customs_OutputEntry_False">
        <text>false</text>
      </outputEntry>
    </rule>
```

```xml
  <rule id="Customs_Rule_International">
   <description>Customs apply on international orders.</description>
   <inputEntry id="Customs_InputEntry_International">
    <text>"International"</text>
   </inputEntry>
   <outputEntry id="Customs_OutputEntry_True">
    <text>true</text>
   </outputEntry>        </rule>
  </decisionTable>
 </decision>


 <!-- 4) Shipping Option (ValidOrder + Customs + Order.deliverySpeed -> ShippingOption) -->
 <decision id="ShippingOption" name="Shipping Option">     <variable name="ShippingOption" typeRef="string"/>
  <informationRequirement id="IR_Shipping_ValidOrder">
   <requiredDecision href="#OrderValidation"/>
  </informationRequirement>
  <informationRequirement id="IR_Shipping_Customs">
   <requiredDecision href="#CustomsRequired"/>
  </informationRequirement>
  <informationRequirement id="IR_Shipping_Order">
   <requiredInput href="#OrderInput"/>
  </informationRequirement>
  <!-- authorityRequirement must be nested inside the decision -->
  <authorityRequirement id="AR_Shipping_Policy">
   <requiredAuthority href="#KnowledgeSource_BusinessPolicy"/>
  </authorityRequirement>
  <decisionTable id="dt_shipping_option">
   <input id="Shipping_Input_ValidOrder" label="Valid Order">
    <inputExpression id="Shipping_InputExpr_ValidOrder" typeRef="boolean">
     <text>ValidOrder</text>
    </inputExpression>
   </input>
   <input id="Shipping_Input_Customs" label="Customs">
    <inputExpression id="Shipping_InputExpr_Customs" typeRef="boolean">
     <text>Customs</text>
    </inputExpression>
   </input>
   <input id="Shipping_Input_Speed" label="Delivery Speed">
```

```xml
        <inputExpression id="Shipping_InputExpr_Speed" typeRef="string">
          <text>Order.deliverySpeed</text>
        </inputExpression>
      </input>
      <output id="Shipping_Output" label="Shipping Option" name="ShippingOption" typeRef="string"/>


      <!-- Valid order + Standard speed -->
      <rule id="Shipping_Rule_Standard_CustomsYes">
        <inputEntry id="Ship_InputEntry_Valid_True_1"><text>true</text></inputEntry>
        <inputEntry id="Ship_InputEntry_Customs_True_1"><text>true</text></inputEntry>
        <inputEntry id="Ship_InputEntry_Speed_Standard_1"><text>"Standard"</text></inputEntry>
        <outputEntry id="Ship_OutputEntry_Standard_1"><text>"Standard Shipment"</text></outputEntry>
      </rule>
      <rule id="Shipping_Rule_Standard_CustomsNo">
        <inputEntry id="Ship_InputEntry_Valid_True_2"><text>true</text></inputEntry>
        <inputEntry id="Ship_InputEntry_Customs_False_1"><text>false</text></inputEntry>
        <inputEntry id="Ship_InputEntry_Speed_Standard_2"><text>"Standard"</text></inputEntry>
        <outputEntry id="Ship_OutputEntry_Standard_2"><text>"Standard Shipment"</text></outputEntry>
      </rule>


      <!-- Valid order + Express speed -->
      <rule id="Shipping_Rule_Express_CustomsNo">
        <inputEntry id="Ship_InputEntry_Valid_True_3"><text>true</text></inputEntry>
        <inputEntry id="Ship_InputEntry_Customs_False_2"><text>false</text></inputEntry>
        <inputEntry id="Ship_InputEntry_Speed_Express_1"><text>"Express"</text></inputEntry>
        <outputEntry id="Ship_OutputEntry_Express_1"><text>"Express Shipment"</text></outputEntry>
      </rule>
      <rule id="Shipping_Rule_Express_CustomsYes_NotProvided">
```

```xml
      <inputEntry
id="Ship_InputEntry_Valid_True_4"><text>true</text></inputEntry>
      <inputEntry
id="Ship_InputEntry_Customs_True_2"><text>true</text></inputEntry>
      <inputEntry
id="Ship_InputEntry_Speed_Express_2"><text>"Express"</text></inputEntry>
      <outputEntry id="Ship_OutputEntry_NotProvided"><text>"Not
Provided"</text></outputEntry>
    </rule>


    <!-- Invalid order -->
    <rule id="Shipping_Rule_InvalidOrder">
      <inputEntry
id="Ship_InputEntry_Valid_False"><text>false</text></inputEntry>
      <inputEntry id="Ship_InputEntry_Customs_Any"><text>-</text></inputEntry>
      <inputEntry id="Ship_InputEntry_Speed_Any"><text>-</text></inputEntry>
      <outputEntry id="Ship_OutputEntry_Blank"><text>""</text></outputEntry>
    </rule>
  </decisionTable>
 </decision>


 <!-- ===== Knowledge Sources (optional, for traceability) ===== -->
 <knowledgeSource id="KnowledgeSource_InternationalLaws" name="International Shipping Laws"/>
 <knowledgeSource id="KnowledgeSource_BusinessPolicy" name="Business Policy"/>
 <!-- ===== Diagram (DMNDI) ===== -->
 <dmndi:DMNDI>
  <dmndi:DMNDiagram id="DMNDiagram_OnlineOrderFulfillment">
   <!-- Nodes -->
   <dmndi:DMNShape id="Shape_ProductAvailability" dmnElementRef="ProductAvailability">
    <dc:Bounds x="470" y="370" width="180" height="80"/>
   </dmndi:DMNShape>


   <dmndi:DMNShape id="Shape_OrderValidation" dmnElementRef="OrderValidation">
    <dc:Bounds x="560" y="240" width="180" height="80"/>
   </dmndi:DMNShape>


   <dmndi:DMNShape id="Shape_ShippingOption" dmnElementRef="ShippingOption">
    <dc:Bounds x="460" y="80" width="180" height="80"/>
   </dmndi:DMNShape>
```

```xml
<dmndi:DMNShape id="Shape_CustomsRequired" dmnElementRef="CustomsRequired">
  <dc:Bounds x="340" y="240" width="180" height="80"/>
</dmndi:DMNShape>


<dmndi:DMNShape id="Shape_PaymentStatus" dmnElementRef="PaymentStatus">
  <dc:Bounds x="687" y="377" width="125" height="45"/>
</dmndi:DMNShape>


<dmndi:DMNShape id="Shape_KS_Laws" dmnElementRef="KnowledgeSource_InternationalLaws">
  <dc:Bounds x="160" y="248" width="100" height="63"/>
</dmndi:DMNShape>


<dmndi:DMNShape id="Shape_KS_Policy" dmnElementRef="KnowledgeSource_BusinessPolicy">
  <dc:Bounds x="160" y="88" width="100" height="63"/>
</dmndi:DMNShape>


<!-- Edges (information requirements) -->
<dmndi:DMNEdge id="Edge_Availability_to_Validation" dmnElementRef="IR_OrderValidation_Availability">
  <di:waypoint x="560" y="370"/>
  <di:waypoint x="620" y="340"/>
  <di:waypoint x="620" y="320"/>
</dmndi:DMNEdge>


<dmndi:DMNEdge id="Edge_Payment_to_Validation" dmnElementRef="IR_OrderValidation_Payment">
  <di:waypoint x="750" y="377"/>
  <di:waypoint x="680" y="340"/>
  <di:waypoint x="680" y="320"/>
</dmndi:DMNEdge>


<dmndi:DMNEdge id="Edge_Customs_to_Shipping" dmnElementRef="IR_Shipping_Customs">          <di:waypoint x="430" y="240"/>
  <di:waypoint x="520" y="180"/>
  <di:waypoint x="520" y="160"/>
</dmndi:DMNEdge>
```

```xml
        <dmndi:DMNEdge id="Edge_Validation_to_Shipping"
dmnElementRef="IR_Shipping_ValidOrder">        <di:waypoint
x="650" y="240"/>

        <di:waypoint x="580" y="180"/>

        <di:waypoint x="580" y="160"/>

      </dmndi:DMNEdge>


      <!-- Authority edges (still point to the same IDs moved inside decisions) -->
      <dmndi:DMNEdge id="Edge_KS_Laws_to_Customs" dmnElementRef="AR_Customs_Laws">

        <di:waypoint x="260" y="280"/>

        <di:waypoint x="340" y="280"/>

      </dmndi:DMNEdge>


      <dmndi:DMNEdge id="Edge_KS_Policy_to_Shipping" dmnElementRef="AR_Shipping_Policy">

        <di:waypoint x="260" y="120"/>

        <di:waypoint x="460" y="120"/>

      </dmndi:DMNEdge>
    </dmndi:DMNDiagram>
  </dmndi:DMNDI>
</definitions>
```