Falko Menge

<workflow /analytica>

OMG’s BPM+:
Industriestandards zur Automatisierung von Prozessen und Entscheidungen

CAMUNDA

<workflow /analytica>

OMG's BPM+

Industriestandards zur Automatisierung von Prozessen und Entscheidungen

Falko Menge, 2022-05-04

@falko_menge

Falko Menge

Senior Principal Solution Architect

Open Standards Ambassador

- 15+ Jahre Prozessautomatisierung
- 10+ Jahre Offene Standards

- https://twitter.com/falko_menge
- https://github.com/falko
- https://www.linkedin.com/in/falko-menge-6b6b56b6

R+V

Bereitstellung von Microservices in einer Cloud-nativen Umgebung mehrmals im Monat nahezu ohne Ausfallzeiten

Wir bei Camunda haben **Unternehmen auf der ganzen Welt geholfen**, ihre komplexen, End-to-End-**Geschäftsprozesse** in nahtlose **Kundenerlebnisse** umzuwandeln.

DB Cargo

Optimierung des europäischen Schienengüterverkehrs für Tausende von Zügen, die jeden Tag fahren

T · ·

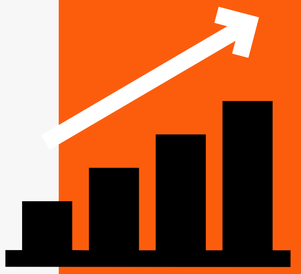
Orchestrierung von Hunderten von RPA-Bots, um einen erstklassigen Kundenservice zu bieten und eine echte digitale Transformation zu erreichen

ATLASSIAN AIRBUS Santander intuit NatWest Allianz vodafone ING

Orchestrierung über alle Endpunkte hinweg

IT und Business zusammenbringen

Unübertroffene Geschwindigkeit, Skalierbarkeit und Resilienz



History & Future of Process Modeling

before 2009

- BPMN 1.x Notation
- Workflow Patterns
- BPEL, WSDL, SOAP
- UML Activity Diagram
- Flow Charts, Petri Nets, YAWL, Workflow Nets

2010-2015

- BPMN 2.0 Model & Notation
- BPMN MIWG
- BPMN Extensions: Color, I18n, Decorator
- OCEB Certification
- CMMN 1.1

2016-2020

- DMN 1.x
- WfMC DMN TCK
- FEEL for BPMN
- OCEB 2 Certification
- CNCF Workflow

2021+

- BKPMN
- SDMN
- BHMN
- SCE
- PPMN

Business Process Model & Notation (BPMN)

until 2002 Development
IBM, Stephen A. White

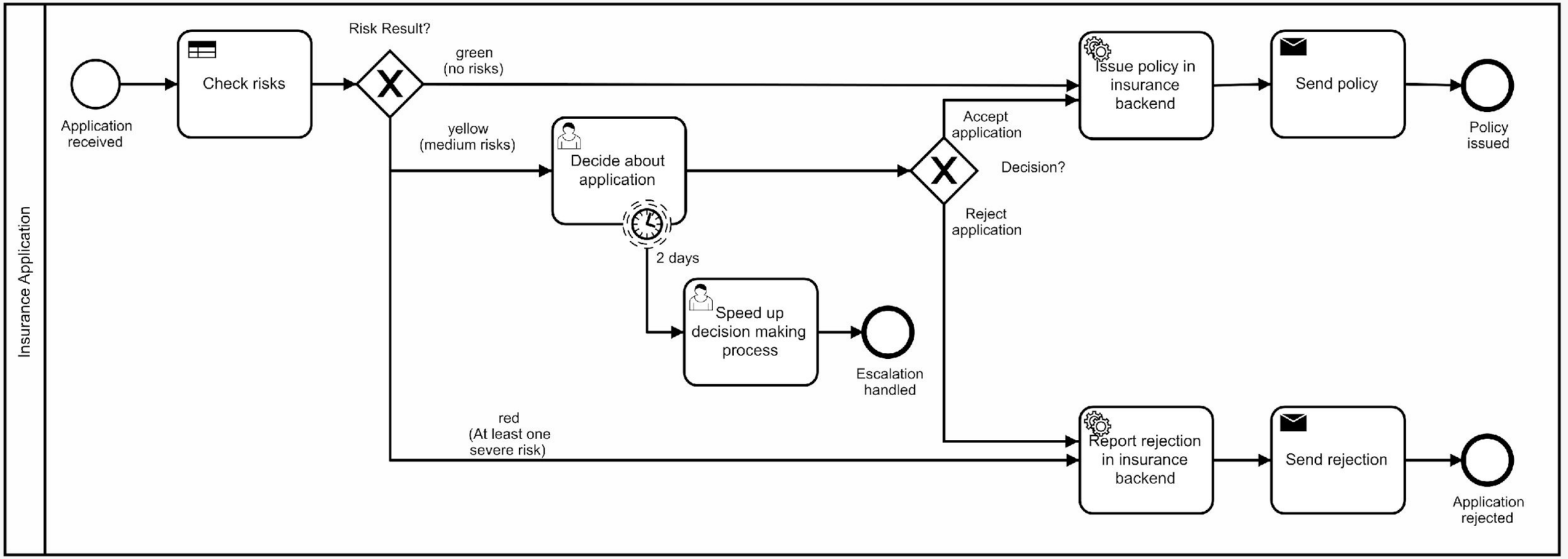
2002 First release
Business Process Management Initiative (BPMI)

2005 Development of version 2.0
Object Management Group (OMG)

2013 Adoption as ISO/IEC 19510:2013
International Standardization Organization

Current version: 2.0.2 since January 2014

Structured Processes with BPMN



BPMN 2.0 - Business Process Model and Notation

Activities

- **Task** — A Task is a unit of work, the job to be performed. When marked with a [+] symbol it indicates a Sub-Process, an activity that can be refined.
- **Transaction** — A Transaction is a set of activities that logically belong together; it might follow a specified transaction protocol.
- **Event Sub-Process** — An Event Sub-Process is placed into a Process or Sub-Process. It is activated when its start event gets triggered and can interrupt the higher level process context or run in parallel (noninterrupting) depending on the start event.
- **Call Activity** — A Call Activity is a wrapper for a globally defined Task or Process reused in the current Process. A call to a Process is marked with a [+] symbol.

Activity Markers

Markers indicate execution behavior of activities:

- Sub-Process Marker
- Loop Marker
- Parallel MI Marker
- Sequential MI Marker
- Ad Hoc Marker
- Compensation Marker

Task Types

Types specify the nature of the action to be performed:

- Send Task
- Receive Task
- User Task
- Manual Task
- Business Rule Task
- Service Task
- Script Task

Sequence Flow

defines the execution order of activities.

Default Flow

is the default branch to be chosen if all other conditions evaluate to false.

Conditional Flow

has a condition assigned that defines whether or not the flow is used.

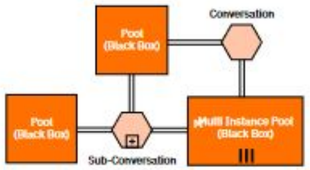
Conversations

A Conversation defines a set of logically related message exchanges. When marked with a [+] symbol it indicates a **Sub-Conversation**, a compound conversation element.

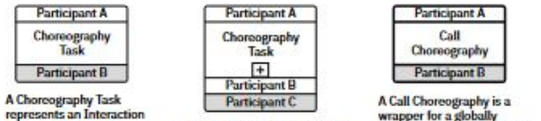
A Call Conversation is a wrapper for a globally defined Conversation or Sub-Conversation. A call to a Sub-conversation is marked with a [+] symbol.

A Conversation Link connects Conversations and Participants.

Conversation Diagram



Choreographies



A Choreography Task represents an Interaction (Message Exchange) between two Participants.

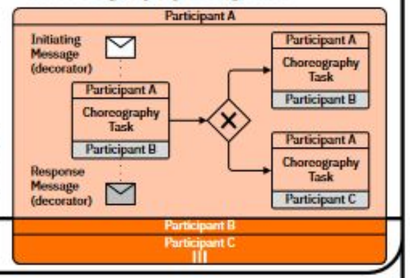
A Sub-Choreography contains a refined choreography with several Interactions.

A Call Choreography is a wrapper for a globally defined Choreography Task or Sub-Choreography. A call to a Sub-Choreography is marked with a [+] symbol.

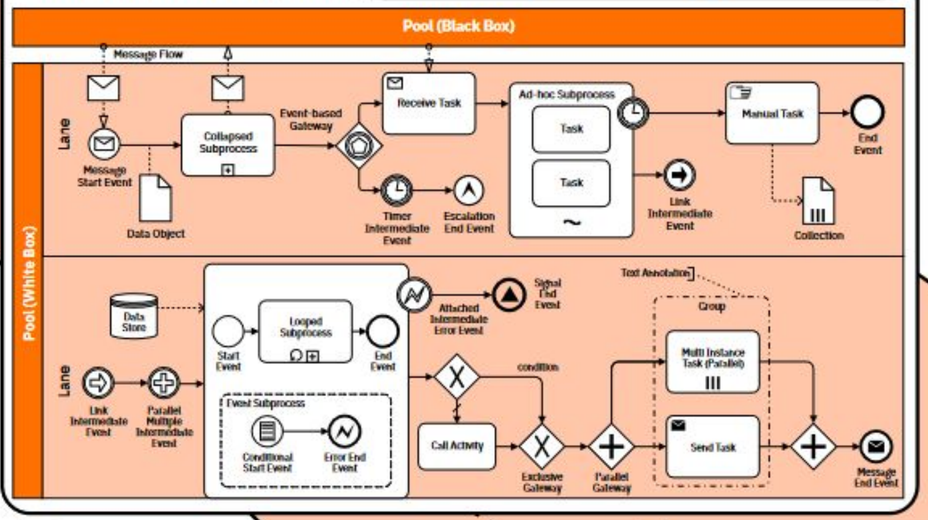
Multiple Participants Marker denotes a set of Participants of the same kind.

Message a decorator depicting the content of the message. It can only be attached to Choreography Tasks.

Choreography Diagram



Collaboration Diagram



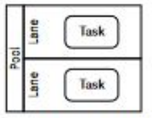
Events

	Start: Standard	Start: Event Sub-Process Interrupting	Start: Event Sub-Process Non-Interrupting	Intermediate: Catching	Intermediate: Boundary Interrupting	Intermediate: Boundary Non-Interrupting	Intermediate: Throwing	End: Standard
None: Untyped events, indicate start point, state changes or final states.	○						○	○
Message: Receiving and sending messages.	✉	✉	✉	✉	✉	✉	✉	✉
Timer: Cyclic timer events, points in time, time spans or timeouts.	🕒	🕒	🕒	🕒	🕒	🕒		
Escalation: Escalating to an higher level of responsibility.		⏃	⏃		⏃	⏃	⏃	⏃
Conditional: Reacting to changed business conditions or integrating business rules.	≡	≡	≡	≡	≡	≡		
Link: Off-page connectors. Two corresponding link events equal a sequence flow.				⇨			⇨	
Error: Catching or throwing named errors.		⚡			⚡			⚡
Cancel: Reacting to cancelled transactions or triggering cancellation.					⊗			⊗
Compensation: Handling or triggering compensation.		⏪			⏪		⏪	⏪
Signal: Signalling across different processes. A signal thrown can be caught multiple times.	△	△	△	△	△	△	▲	▲
Multiple: Catching one out of a set of events. Throwing all events defined.	⬠	⬠	⬠	⬟	⬟	⬟	⬟	⬟
Parallel Multiple: Catching all out of a set of parallel events.	✚	✚	✚	✚	✚	✚		
Terminate: Triggering the immediate termination of a process.								●

Gateways

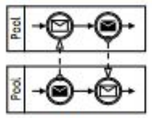
- **Exclusive Gateway** — When splitting, it routes the sequence flow to exactly one of the outgoing branches. When merging, it awaits one incoming branch to complete before triggering the outgoing flow.
- **Event-based Gateway** — Is always followed by catching events or receive tasks. Sequence flow is routed to the subsequent event/task which happens first.
- **Parallel Gateway** — When used to split the sequence flow, all outgoing branches are activated simultaneously. When merging parallel branches it waits for all incoming branches to complete before triggering the outgoing flow
- **Inclusive Gateway** — When splitting, one or more branches are activated. All active incoming branches must complete before merging.
- **Exclusive Event-based Gateway (instantiate)** — Each occurrence of a subsequent event starts a new process instance.
- **Complex Gateway** — Complex merging and branching behavior that is not captured by other gateways.
- **Parallel Event-based Gateway (instantiate)** — The occurrence of all subsequent events starts a new process instance.

Swimlanes



Pools (Participants) and **Lanes** represent responsibilities for activities in a process. A pool or a lane can be an organization, a role, or a system. Lanes subdivide pools or other lanes hierarchically.

Message Flow symbolizes information flow across organizational boundaries. Message flow can be attached to pools, activities, or message events. The Message Flow can be decorated with an envelope depicting the content of the message.



The order of message exchanges can be specified by combining message flow and sequence flow.

Data

- **A Data Object** represents information flowing through the process, such as business documents, e-mails, or letters.
- **A Collection Data Object** represents a collection of information, e.g., a list of order items.
- **A Data Input** is an external input for the entire process. A kind of input parameter.
- **A Data Output** is data result of the entire process. A kind of output parameter.
- **A Data Association** is used to associate data elements to Activities, Processes and Global Tasks.
- **A Data Store** is a place where the process can read or write data, e.g., a database or a filing cabinet. It persists beyond the lifetime of the process instance.

CAMUNDA

www.camunda.com

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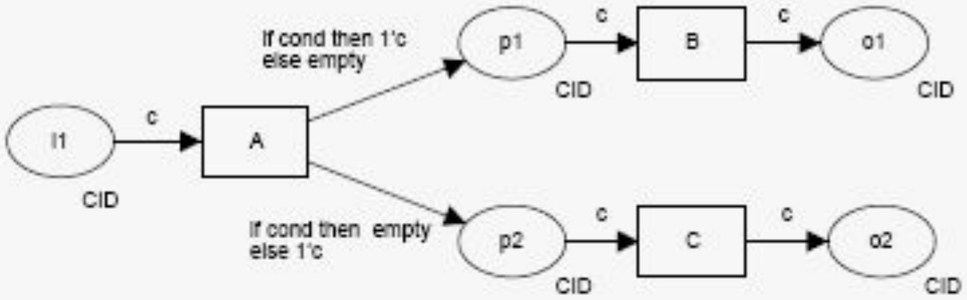
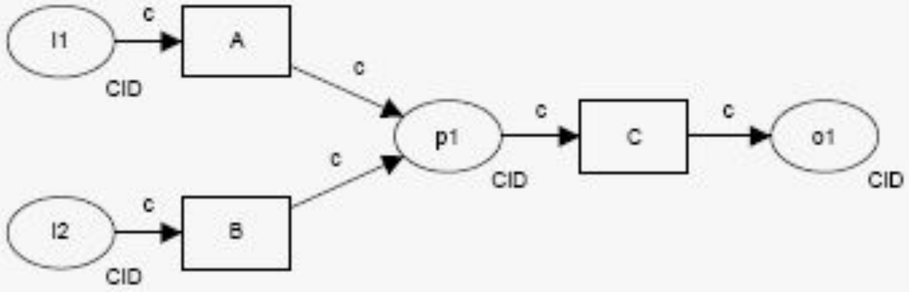
https://page.camunda.com/wp-bpmn-2-0-business-process-model-and-notation-en

https://page.camunda.com/de/wp-bpmn-2-0-business-process-model-and-notation

What makes it so successful?

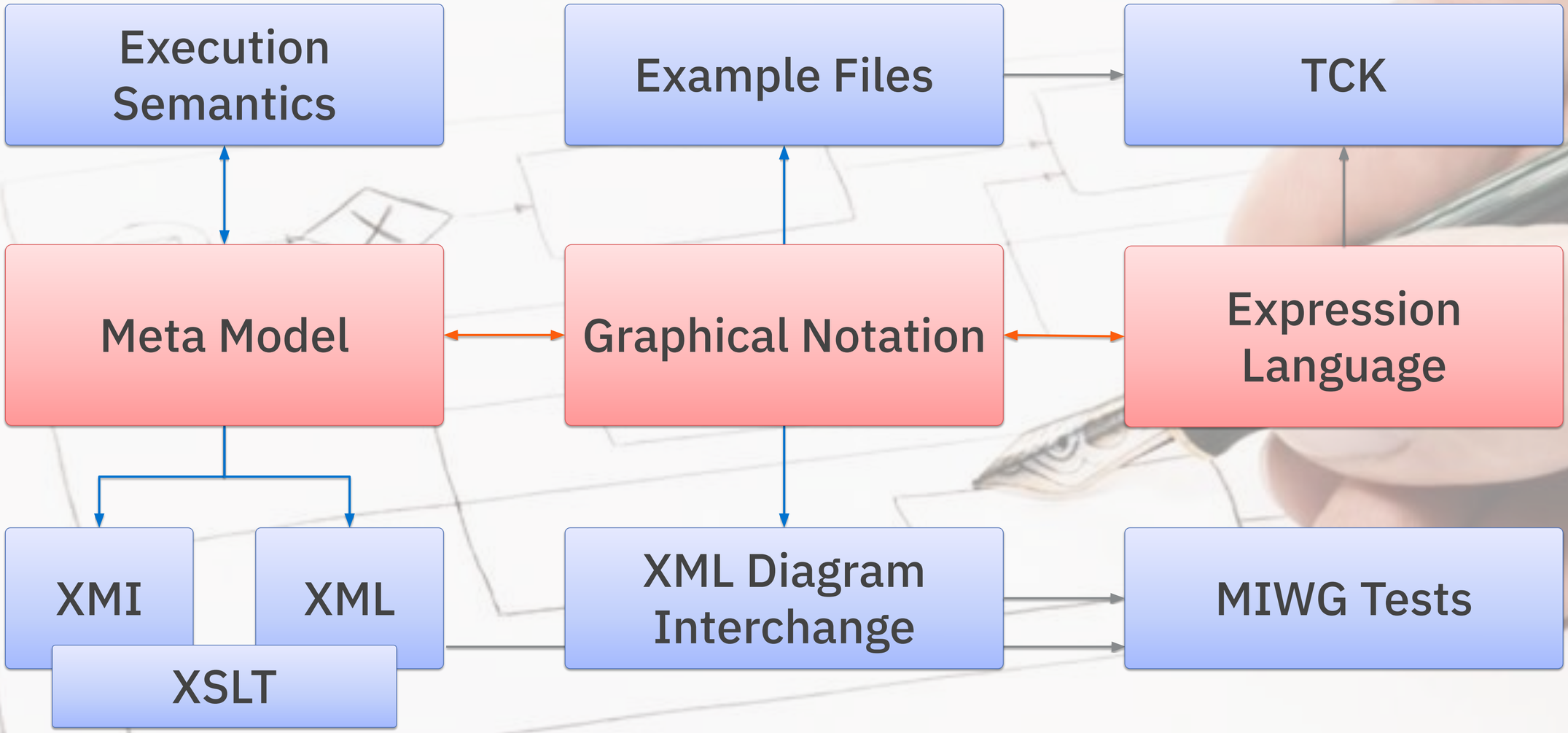
- Expressive graphical notation with high coverage of the Workflow Patterns, i.e. it is a feature-complete workflow language
- Supports service orchestration, human task management, and business rules
- Technology-independent
- Execution semantics define exact engine behavior
- Extensible
- Stable





workflowpatterns.com

What makes it so successful?

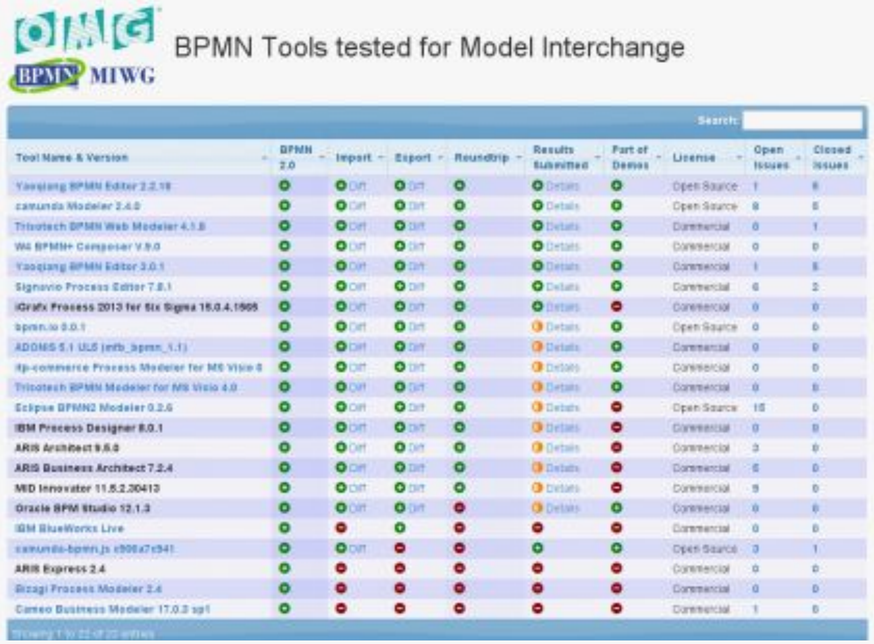


BPMN Model Interchange Working Group (MIWG)

- Test suite for BPMN XML import/export
- 18 reference models
- 37 BPMN tools tested
- Annual live demonstrations at conferences

http://bpmn-miwg.github.io/b

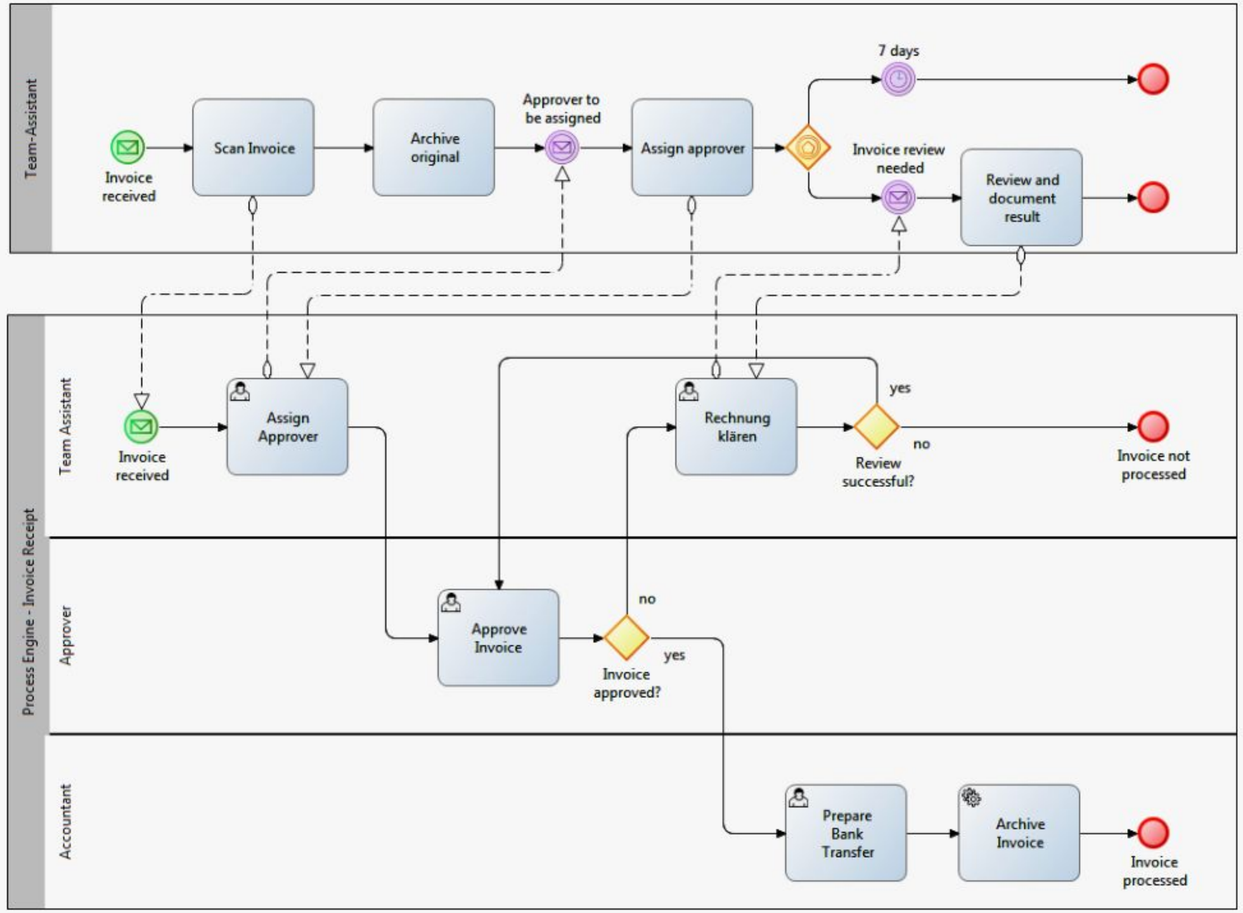
Test your favorite BPMN tool



https://github.com/bpmn-miwg/bpmn-miwg-test-suite#how-to-test-a-bpmn-tool-using-this-test-suite

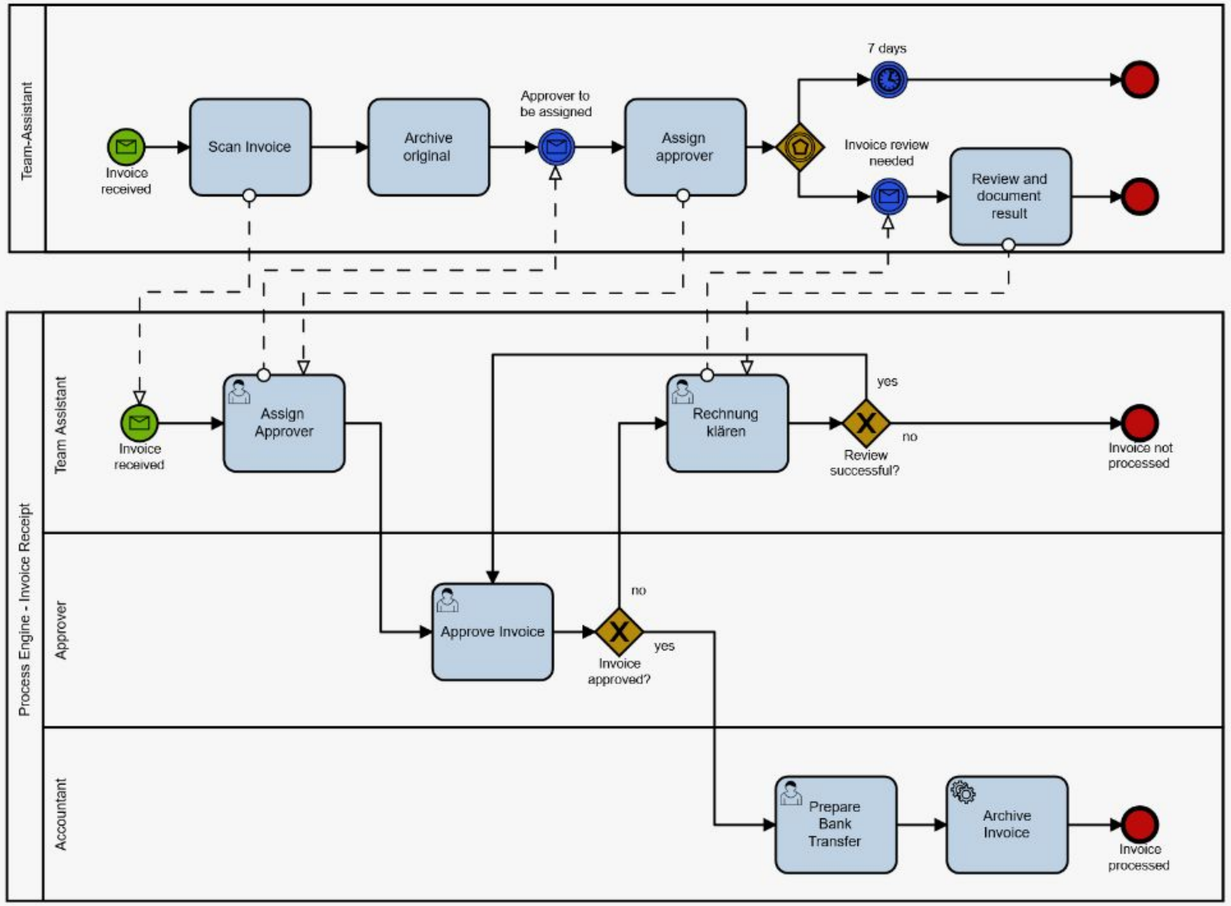
BPMN Model Interchange Tests

C.1.0 reference



Bounds Overlay | BPMN file | Reference folder

C.1.0 import

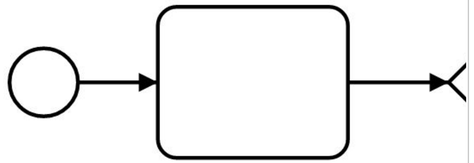
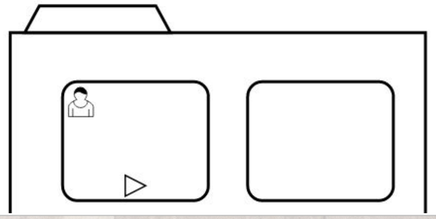


Bounds Overlay | Results folder

https://www.omgwiki.org/bpmn-miwg/

Business Process Management

BPM+

Processes	Decisions	Cases
BPMN	**DMN**	**CMMN**
		
Process Automation	Decision Automation	Case Management

Decision Model & Notation (DMN)

Decision Logic

Decision Table

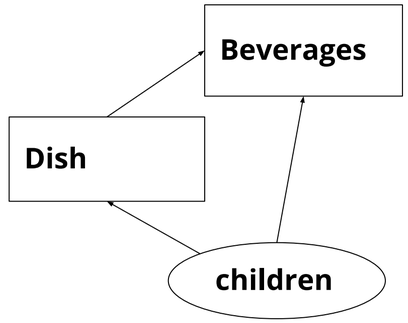
Dish | **Hit Policy:** Unique

	When Season string	Then Dish string
1	"Fall"	"Spareribs"
2	"Winter"	"Roastbeef"
3	"Spring"	"Steak"
4	"Summer"	"Light Salad and a nice Steak"

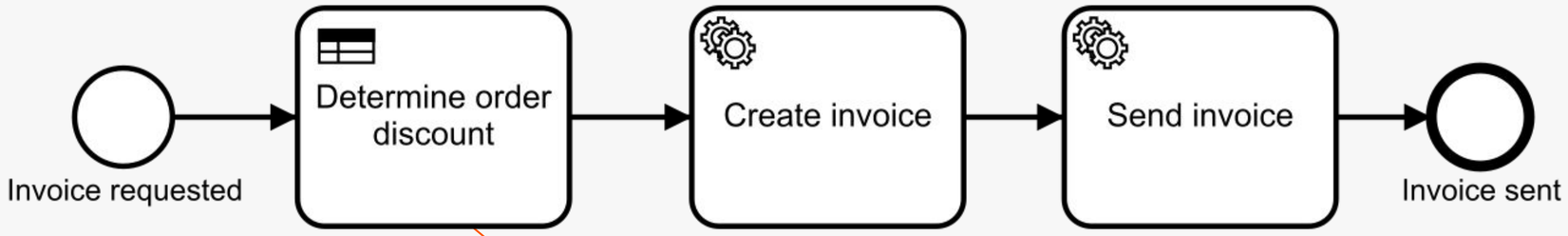
Expression Language

```
guests.
vegetarians.
size
> 0
```

Decision Requirements Diagram (DRD)



Business Rule Task invokes Decision Table

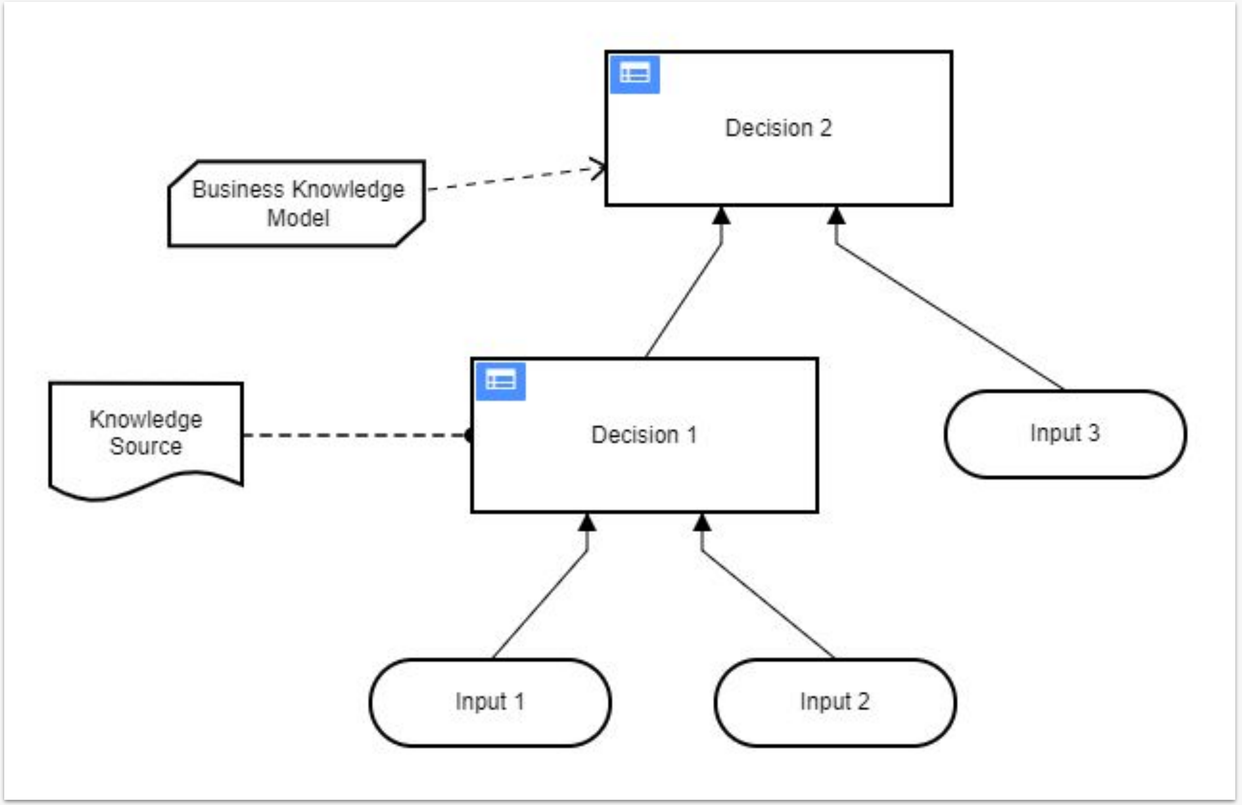


Order Discount | **Hit Policy:** Unique

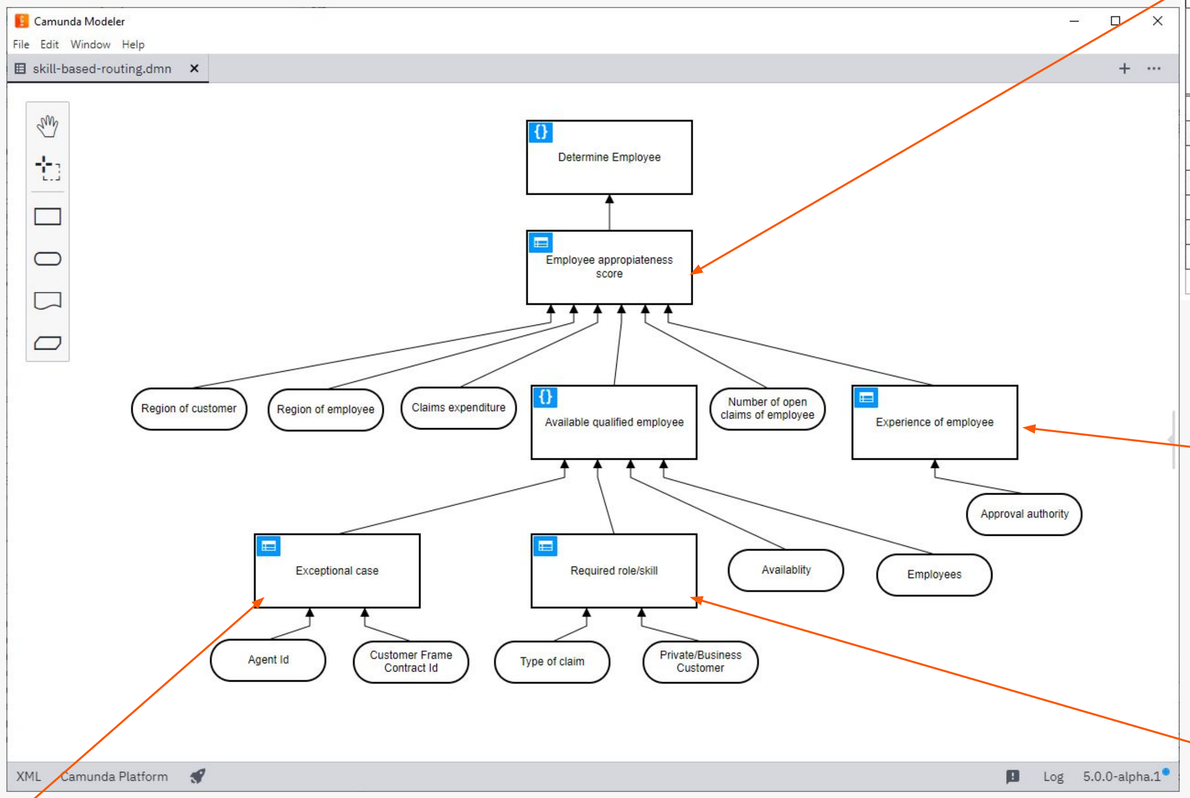
	When	Then	
	Order Amount (long)	Discount (integer)	Annotations
1	<500	0	
2	[500..999]	2	
3	[1000..1999]	3	
4	[2000..4999]	5	
5	>=5000	8	

Beyond (Or Before) Decision Tables

- Decision Requirements Diagram (DRD)
- Interrelationships and requirements of decisions
- Allows modeling complex decisions => divide and conquer



DRD Decisions reference Decision Tables



Employee appropiateness score — Hit Policy: Collect (Sum)

	When: Region of employee = Region of customer (boolean)	And: Experience of employee ("low","medium")	And: Claims expenditure (integer)	And: Number of open claims of employee (integer)	Then: - (integer)
1	true	-	-	-	100
2	-	"low"	[1000..10000]	-	-100
3	-	"low"	> 10000	-	-1000
4	-	"medium"	> 10000	-	-100
5	-	-	-	[10..19]	-100
6	-	-	-	[20..29]	-500
7	-	-	-	>= 30	-1000
+	-	-	-	-	

Experience of employee — Hit Policy: Unique

	When: Approval Authority (integer)	Then: Experience ("low","medium","high")
1	< 1000	"low"
2	[1000..10000]	"medium"
3	> 10000	"high"
+	-	

Exceptional case — Hit Policy: Unique

	When: Agent Id (string)	And: Customer Frame Contract Id (string)	Then: Required Role (string)	And: Special Employee (string)
1	"4711"	-	"Special Task Force Berlin"	
2	-	"0815"	"Special Task Force Berlin"	
3	-	"camunda"		"Mr. Important"
+	-	-		

Required role/skill — Hit Policy: Unique

	When: Type of claim ("Third Party Liability","Accident")	And: Private/Business Customer ("Private","Business")	Then: Required Role ("Service Center","Business Acci...)	And: Required Skill (string)
1	"Third Party Liability"	"Private"	"Service Center"	
2	"Third Party Liability"	"Business"	"Service Center"	"Business Law Qualification"
3	"Accident"	"Private"	"Service Center"	
4	"Accident"	"Business"	"Business Accident Team"	
+	-	-		

Friendly Enough Expression Language (FEEL)

- Simple syntax designed for a wide audience => “easier than Excel”
- Standard **executable** semantics
- Side-effect free

S-Feel Examples: Simple Expressions

F	Input +	Output +
	Season	Dish
	string	string
1	"Winter"	"Steak"
2	"Winter", "Spring", "Summer"	"Salad"

Multiple Strings follow „OR“ logic

https://docs.camunda.io/docs/components/modeler/feel/what-is-feel/

Friendly Enough Expression Language (FEEL)

[date and time(„2016-12-24T00:00:00“)
..
date and time(„2016-12-26T23:59:99“)]

Support for different „endpoint“ data types: number, string, boolean, time, date, date-time, time-duration.

Simple Expressions | **Hit Policy:** Fi

	When Season string	And Date date	And Number of guests integer	And Children boolean	Dish string	Annotations
1	-	[date and time("2016-12-24T00:00:00")..date and time("2016-12-26T23:59:99")]	-	-	"Christmas Dinner"	
2	"Winter"	-	-	true	"Vegetables"	
3	"Winter"	-	<=6	-	"Steak"	
4	"Winter"	-	]6..10[	-	"Pizza"	Same as (6..10)
5	"Winter"	-	[10..12]	-	"Huge Pizza"	
6	"Winter"	-	12,[13..14],>14	-	"Family Deluxe Pizza"	
7	"Spring", "Summer", "Fall"	-	-	true	"Salad"	
8	not("Winter")	-	-	false	"Salad with Goat Cheese"	
9	not("Spring","Summer","Fall")	-				again ;-)
+						

Negation

Support for Comparison (<, <=, >, >=) and Ranges ([x..y]):

- Start included: [
- Start excluded:] or (
- End included:]
- End excluded: [or)

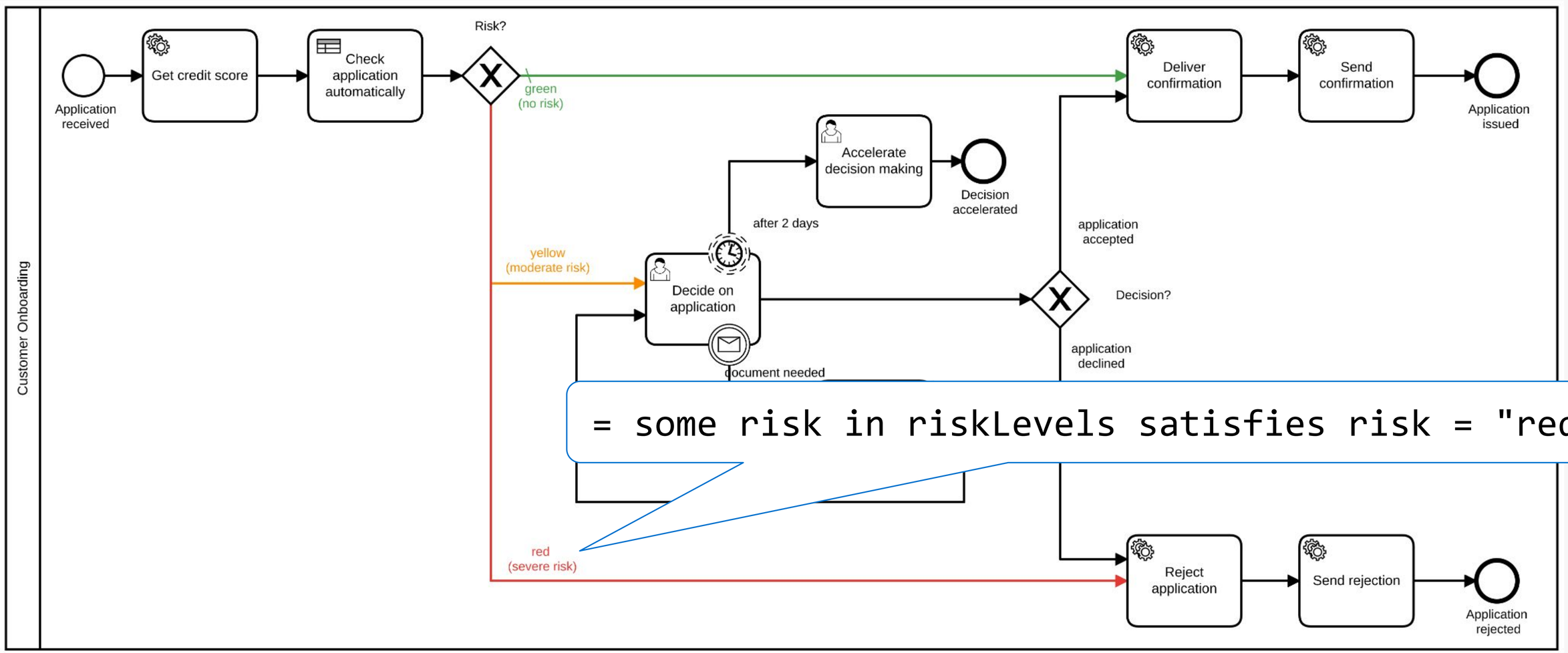
https://docs.camunda.io/docs/components/modeler/feel/language-guide/feel-unary-tests/

Standardized library of built-in functions

```
contains("foobar", "bar")

applicant.monthly.income * 12

if applicant.maritalStatus in ("M","S") then "valid" else "not valid"

sum( [applicant.monthly.repayments, applicant.monthly.expenses] )

sum( credit_history[record_date > date("2011-01-01")].weight )

some ch in credit_history satisfies ch.event = "bankruptcy"
```

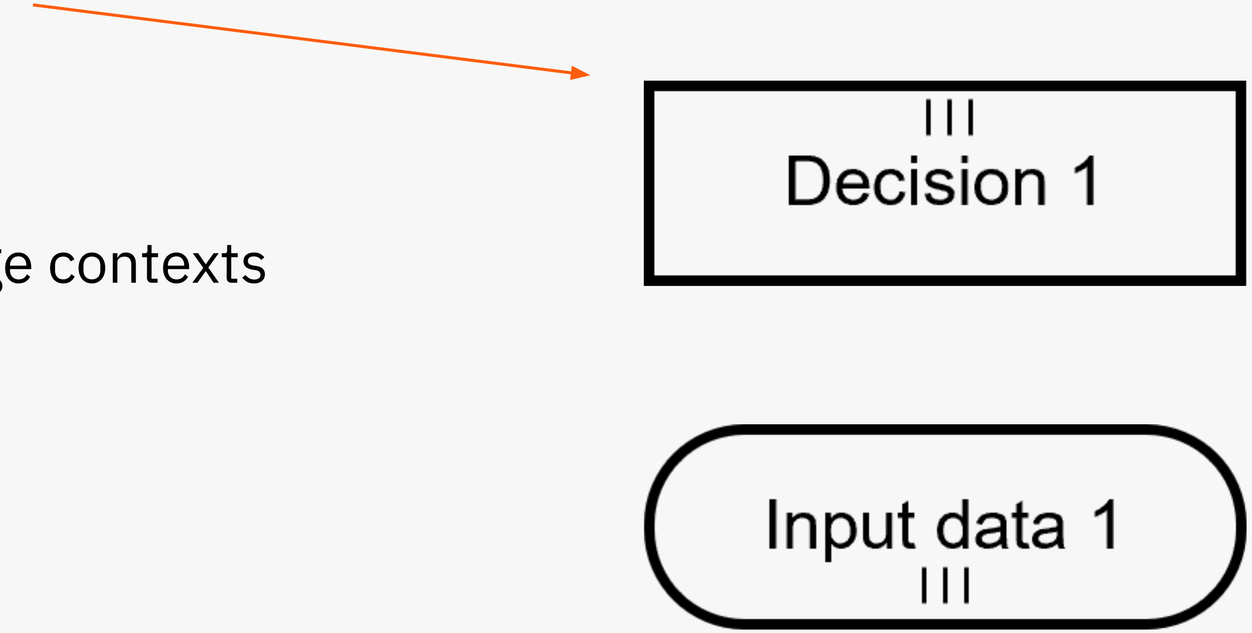
https://docs.camunda.io/docs/components/modeler/feel/builtin-functions/feel-built-in-functions-introduction/

FEEL in BPMN

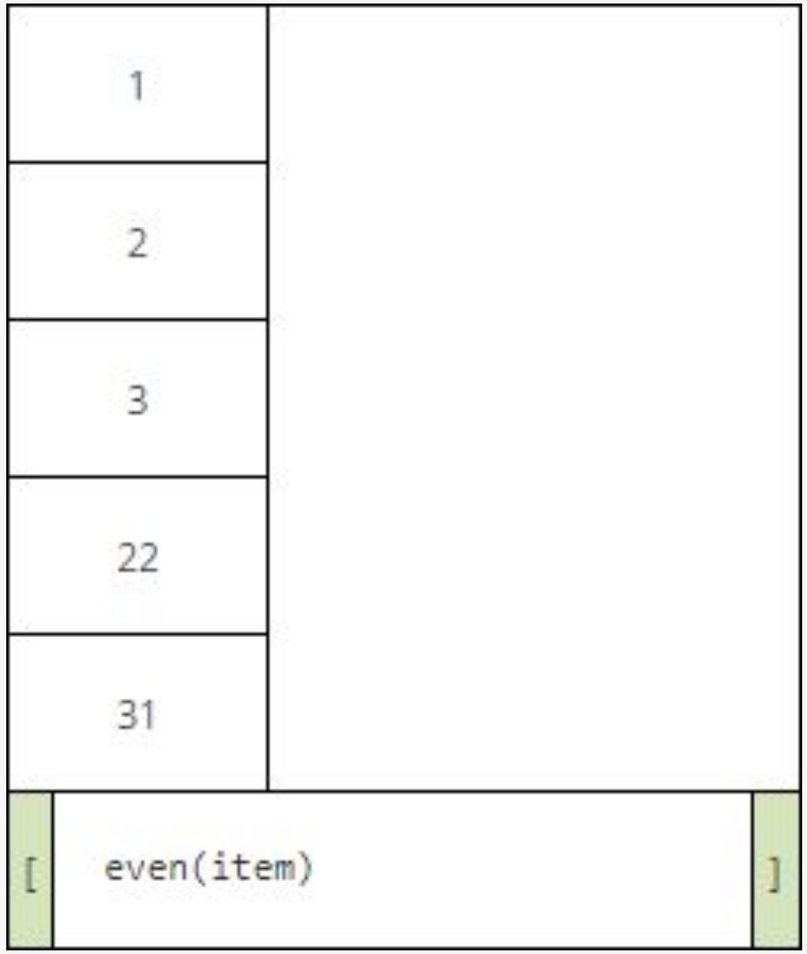

Customer Onboarding
Application received
Get credit score
Check application automatically
Risk?
green (no risk)
Deliver confirmation
Send confirmation
Application issued
Accelerate decision making
Decision accelerated
after 2 days
application accepted
yellow (moderate risk)
Decide on application
Decision?
application declined
document needed
= some risk in riskLevels satisfies risk = "red"
red (severe risk)
Reject application
Send rejection
Application rejected

New Features in DMN 1.4

- Short-paced maintenance release
  - Addresses feedback from users, implementers, and TCK of WfMC
- Collection Marker in DRDs
- Boxed Expressions for
  - Filter
  - Conditional
  - Iterator
- New FEEL Functions
  - string join
  - create, add to & merge contexts
  - today & now
  - round
- Improved Examples
  => all fully backwards compatible



New Boxed Expression: Filter



New Boxed Expression: Conditional

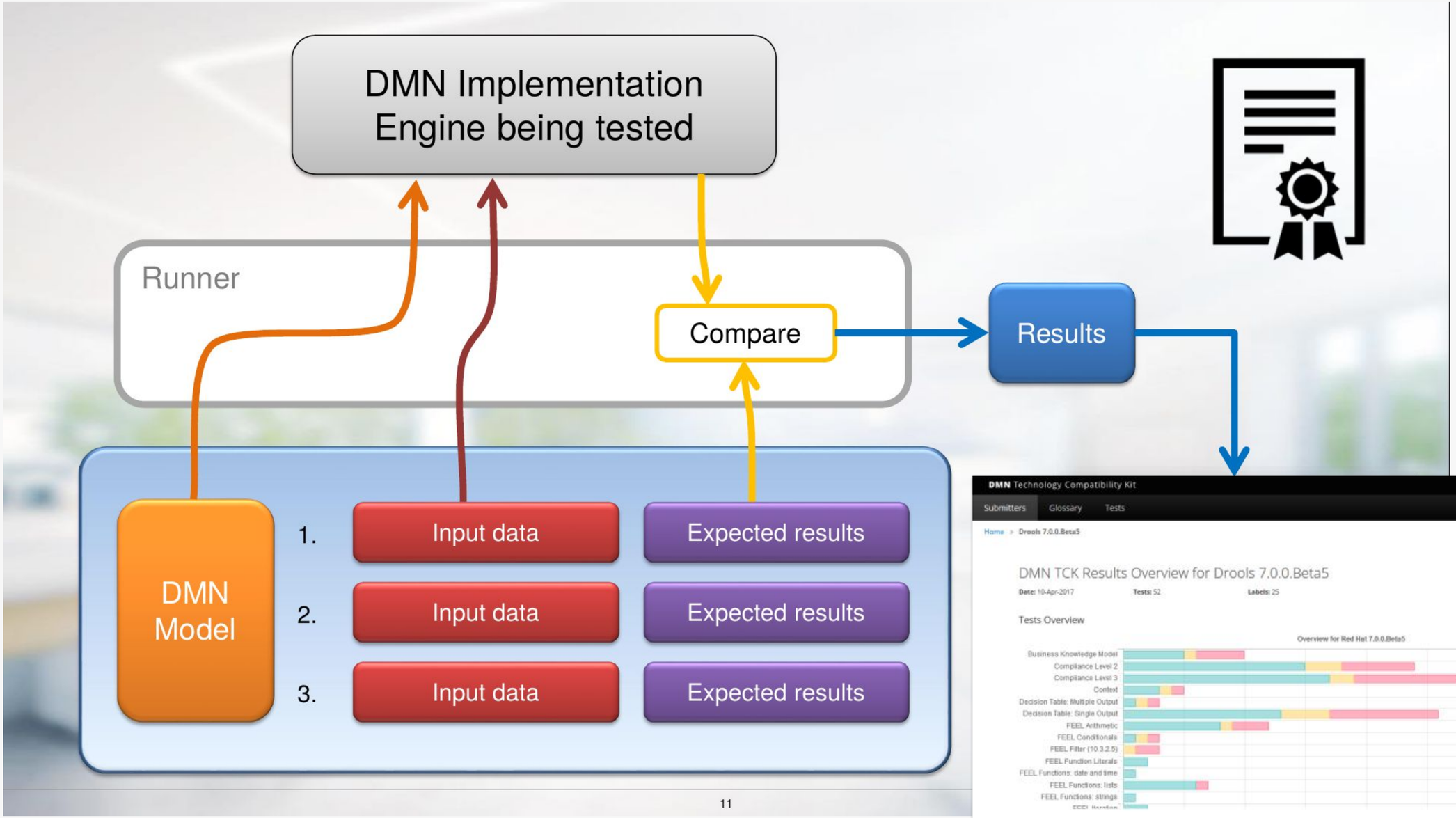
if	U	Credit Score Rating	if
		"Poor", "Bad", "Fair", "Good", "Excellent"	
	1	"Good", "Excellent"	true
	2	"Poor","Bad","Fair"	false
then	Calculate interest rate		
	customer info	Customer Info	
else	Calculate risky interest rate		
	customer info	Customer Info	

New Boxed Expression: Iterator

some	customer		
in	Name	Age	
	Text	*Number*	
	"Georges"	55	
	"Henry"	69	
	"Alexander"	10	
	"Emma"	5	
	"Jane"	39	

satisfies	U	customer.Age	satisfies
		Number	*Boolean*
	1	<18	false
	2	>=18	true

DMN Technology Compatibility Kit (TCK)



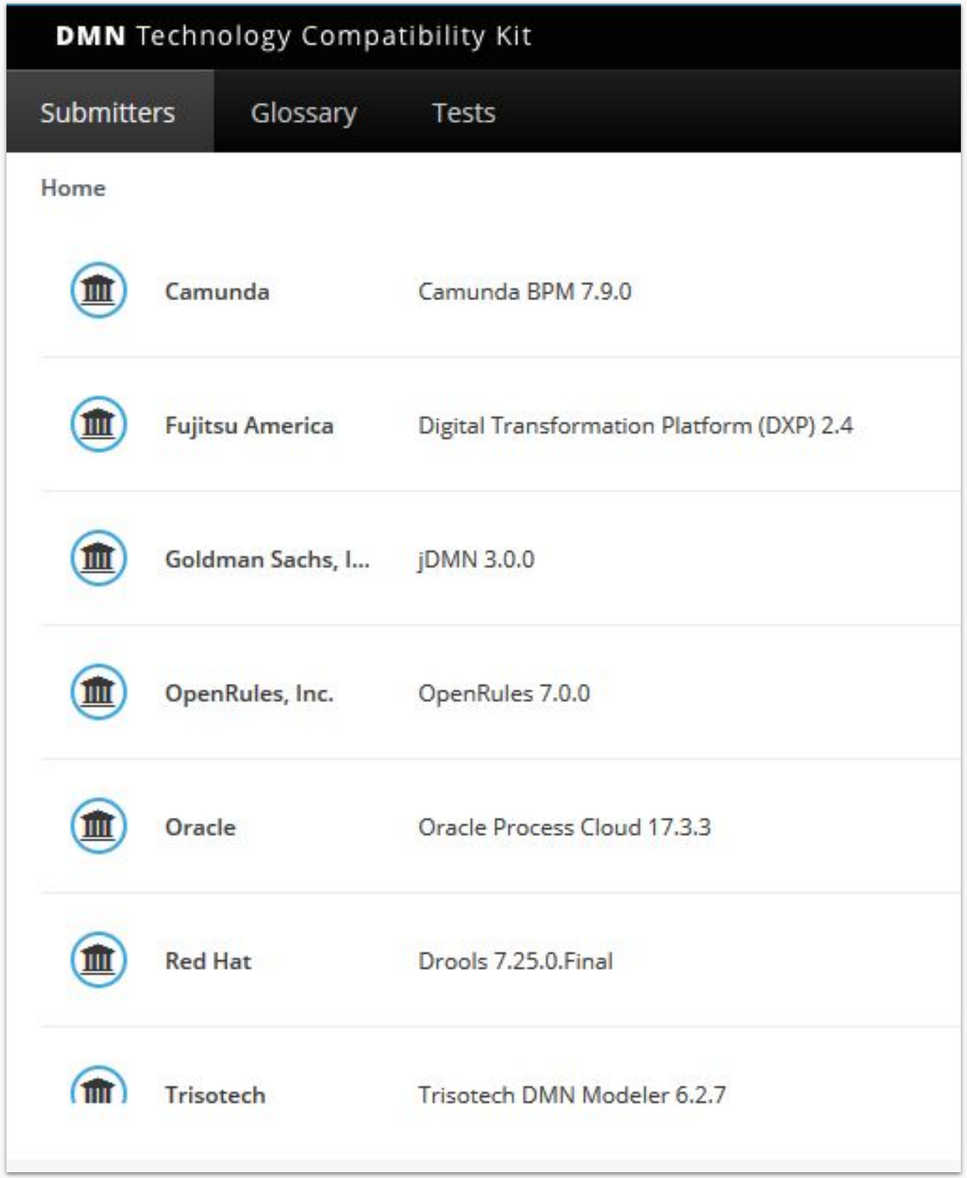
source:
Keith D Swenson, “Close is Not Close Enough”, Decision Camp 2019

DMN Technology Compatibility Kit (TCK)

- 1700 Test Cases
- 120 DMN Models
- Helps Vendors become compliant
- 8 Vendors **demonstrate** their compliance
- Also reveals issues with the spec, which are then reported to the RTF

https://dmn-tck.github.io/tck/

Submit your models to the DMN TCK!



Case Management Model & Notation (CMMN)

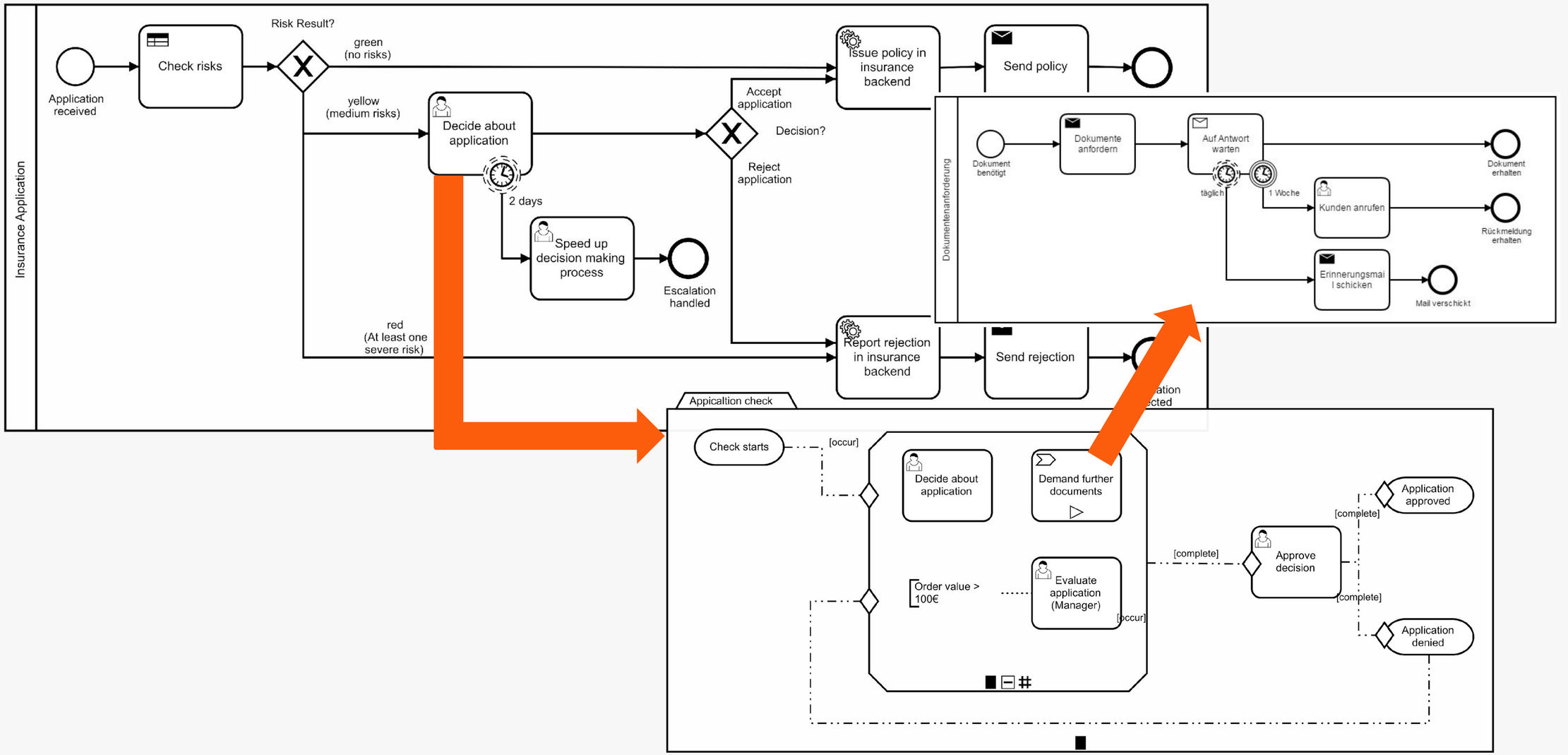
„Activities that are **not so predefined and repeatable**, but instead depend on **evolving** circumstances and **ad hoc** decisions by **knowledge workers** regarding a particular situation”

Case Management Model and Notation	
OMG standard since	2014
ISO standard since	-
Subject	Cases
Graphical modeling	☐
XML interchange format	☐
Technical execution	☐

Current version: 1.1 (December 2016)

omg.org/spec/CMMN

Unstructured processes with CMMN



The main differences between CMMN and BPMN

	CMMN	BPMN
Focus	State (Case)	Flow (Process)
Execution control	Human (mostly)	Process
Modelling concept	Declarative	Imperative
Degree of freedom (human)	High	Low

CMMN never lived up to its potential

- Child of the Adaptive Case Management hype
- Not adaptive
- Combination with BPMN necessary for not so unpredictable parts
  - Requires learning a second language
- Steep learning curve
- Not based on existing notations
- Hard to read
- A lot of behavior hidden within rules
- In practice, most use cases can be done using BPMN.
  - Events more explicit
  - Compact notation shortcuts available

https://camunda.com/blog/2020/08/how-cmmn-never-lived-up-to-its-potential/

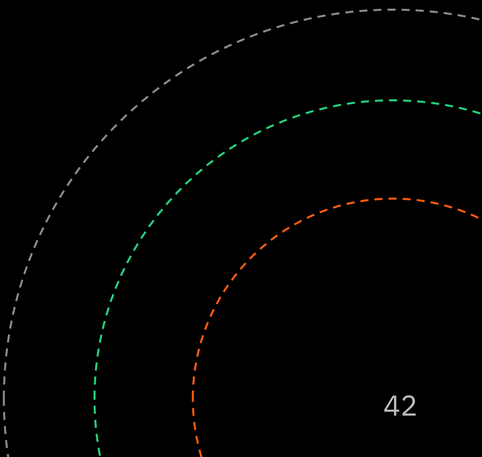
Adoption based on GitHub data

- BPMN20.xsd - 70,500 code results

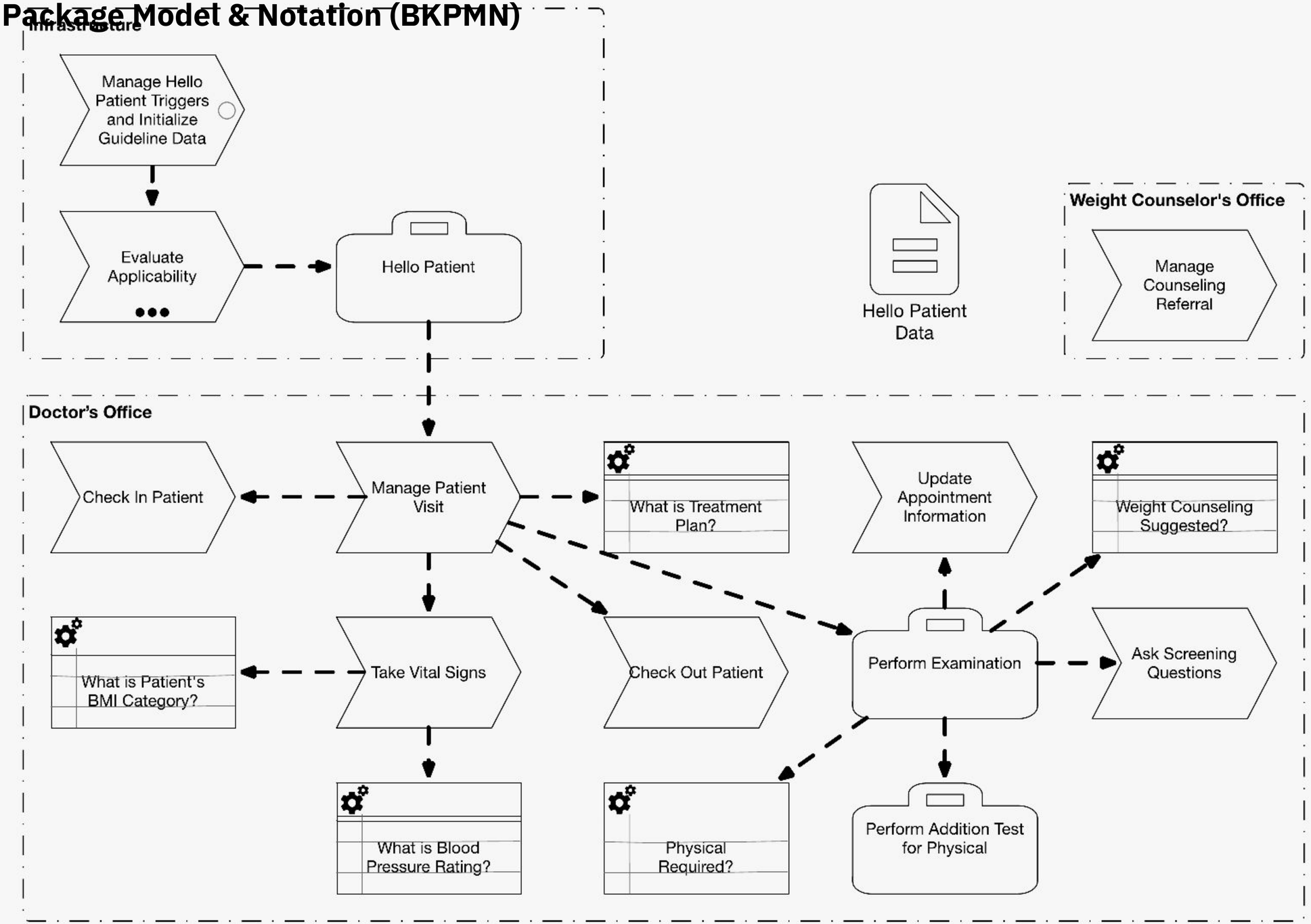
- dmn.xsd - 8,736 code results => DMN 1.0 or 1.1
- DMN12.xsd - 58 code results
- DMN13.xsd - 38 code results

- CMMN10.xsd - 28 code results
- CMMN11.xsd - 219 code results

New BPM+ Standards in Finalization at OMG

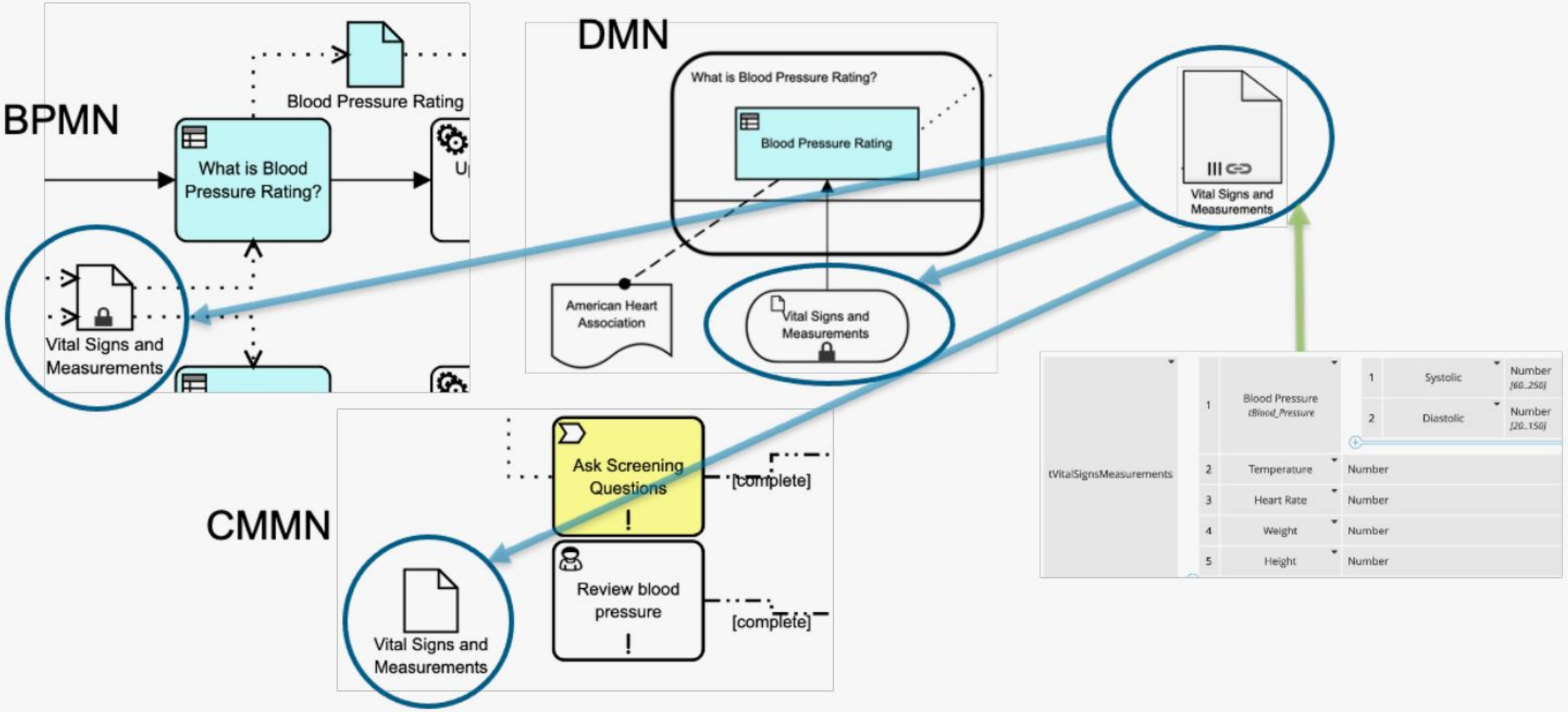


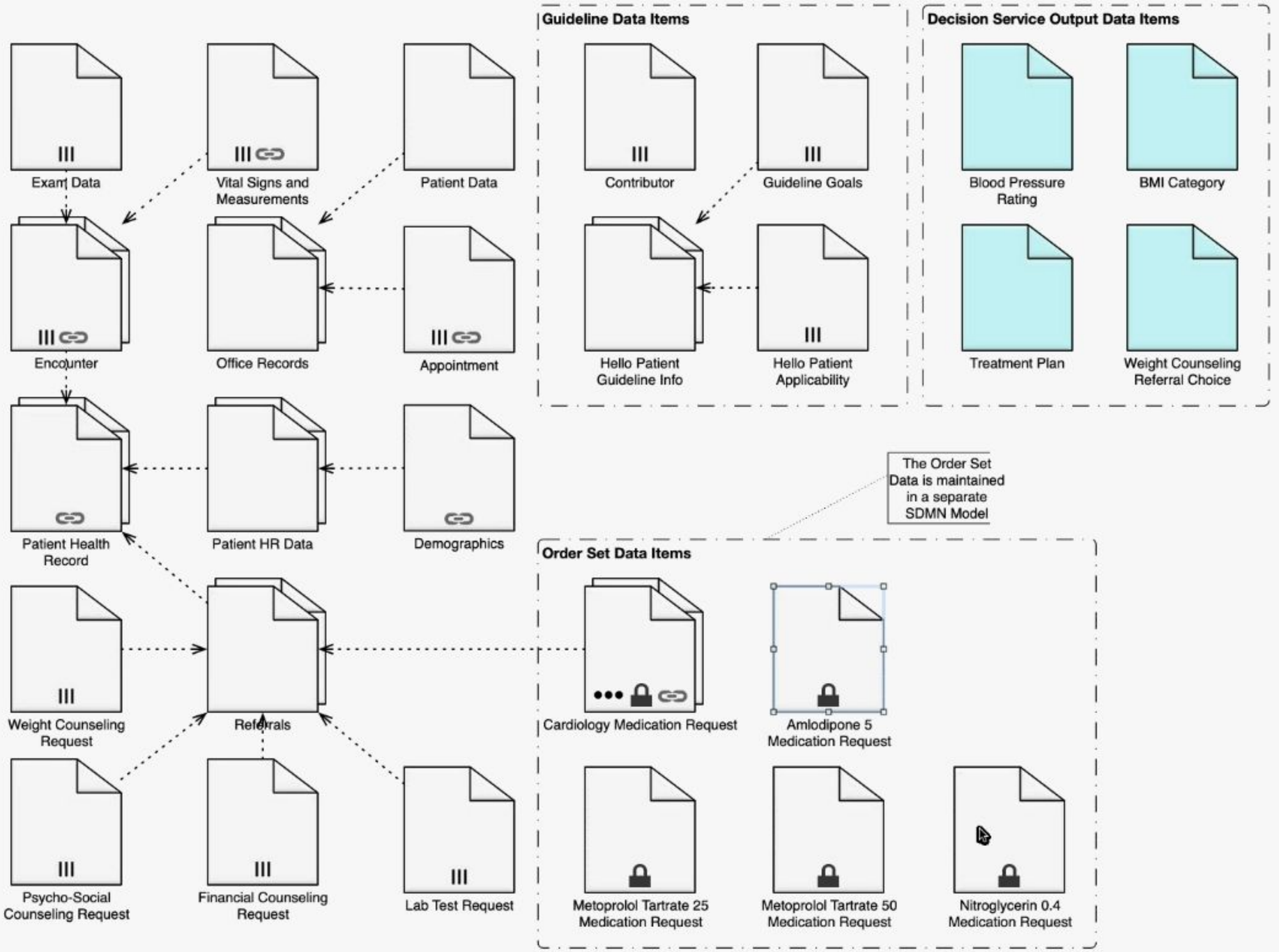
BPM+ Knowledge Package Model & Notation (BKPMN)



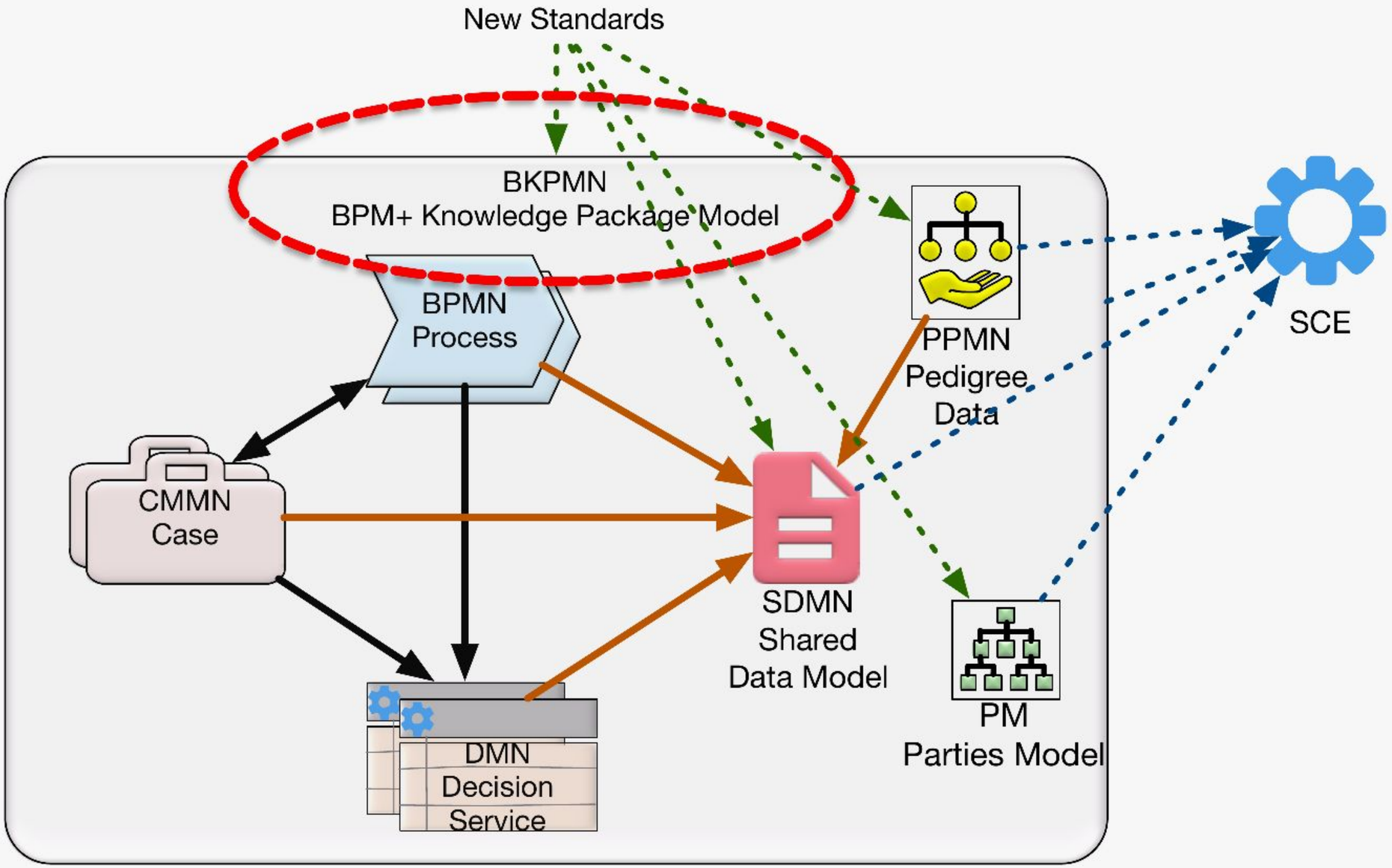
omg.org/spec/BKPMN

Shared Data Model & Notation (SDMN)

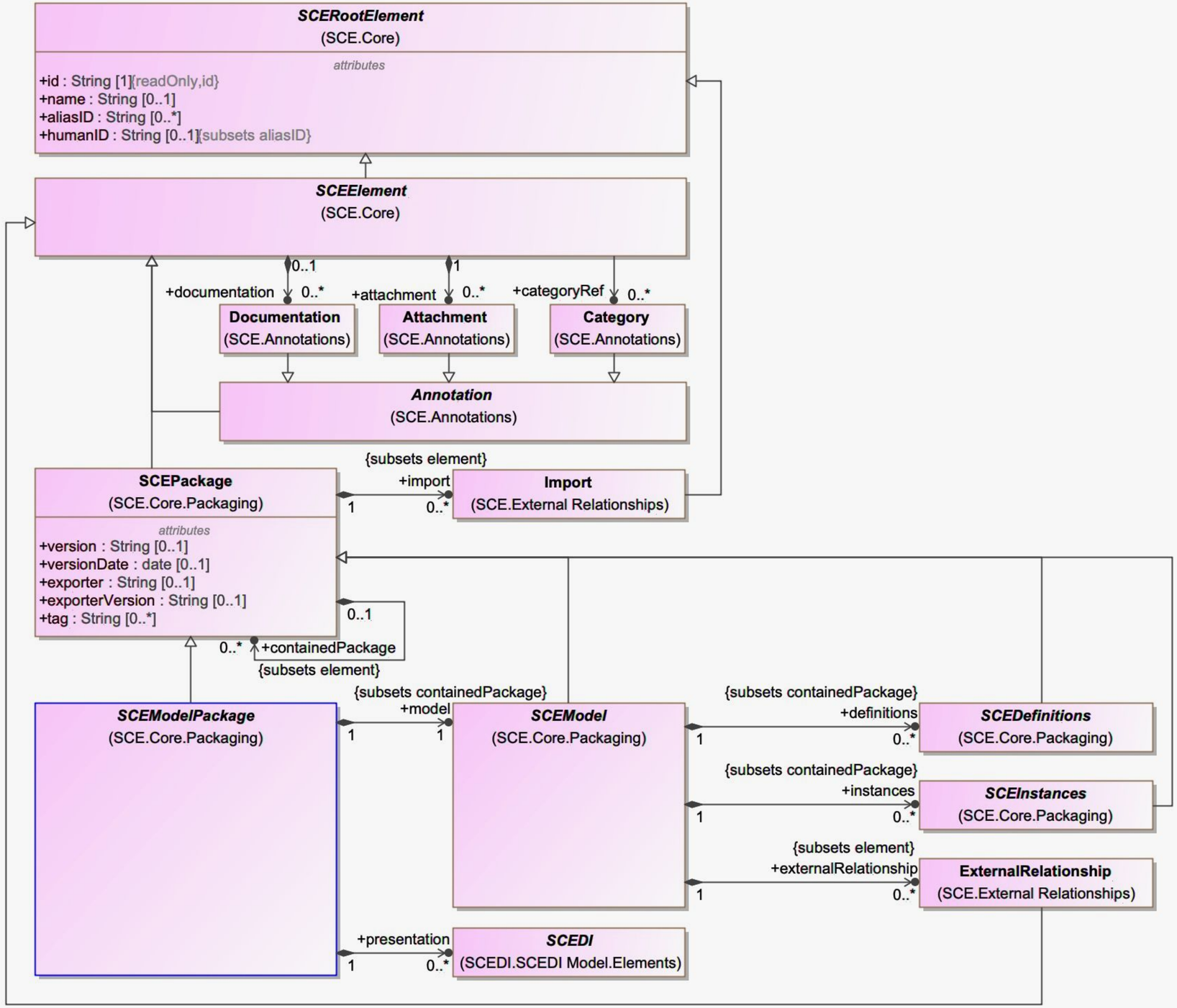



Guideline Data Items
Decision Service Output Data Items
Exam Data
Vital Signs and Measurements
Patient Data
Contributor
Guideline Goals
Blood Pressure Rating
BMI Category
Encounter
Office Records
Appointment
Hello Patient Guideline Info
Hello Patient Applicability
Treatment Plan
Weight Counseling Referral Choice
Patient Health Record
Patient HR Data
Demographics
The Order Set Data is maintained in a separate SDMN Model
Order Set Data Items
Weight Counseling Request
Referrals
Cardiology Medication Request
Amlodipone 5 Medication Request
Psycho-Social Counseling Request
Financial Counseling Request
Lab Test Request
Metoprolol Tartrate 25 Medication Request
Metoprolol Tartrate 50 Medication Request
Nitroglycerin 0.4 Medication Request

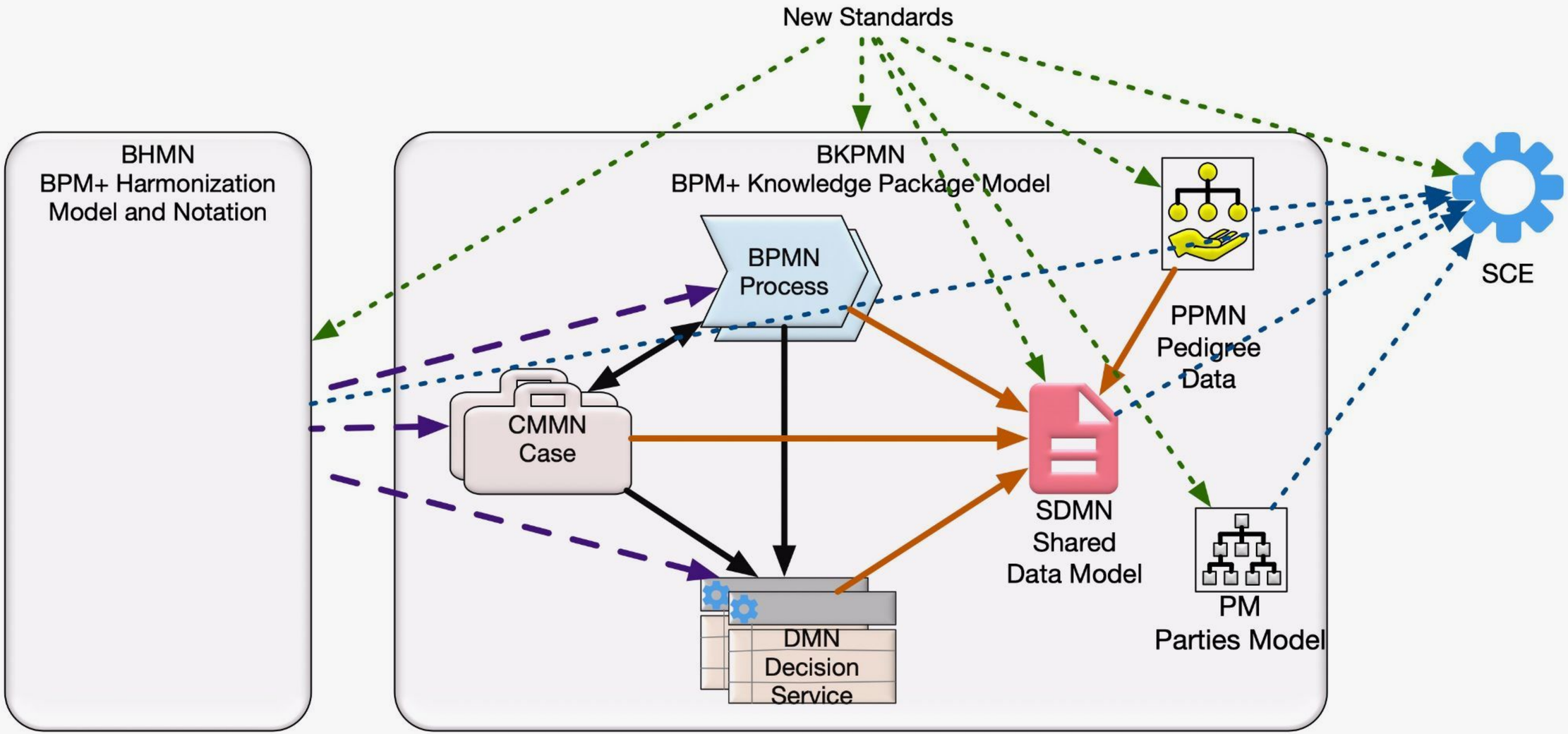
Specification Core Elements (SCE)



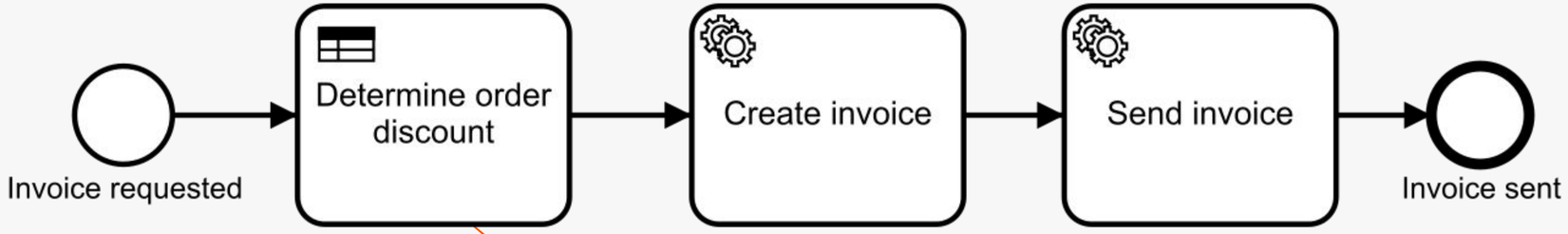
SCE Meta Model



BPM+ Harmonization Model & Notation (BHMN)

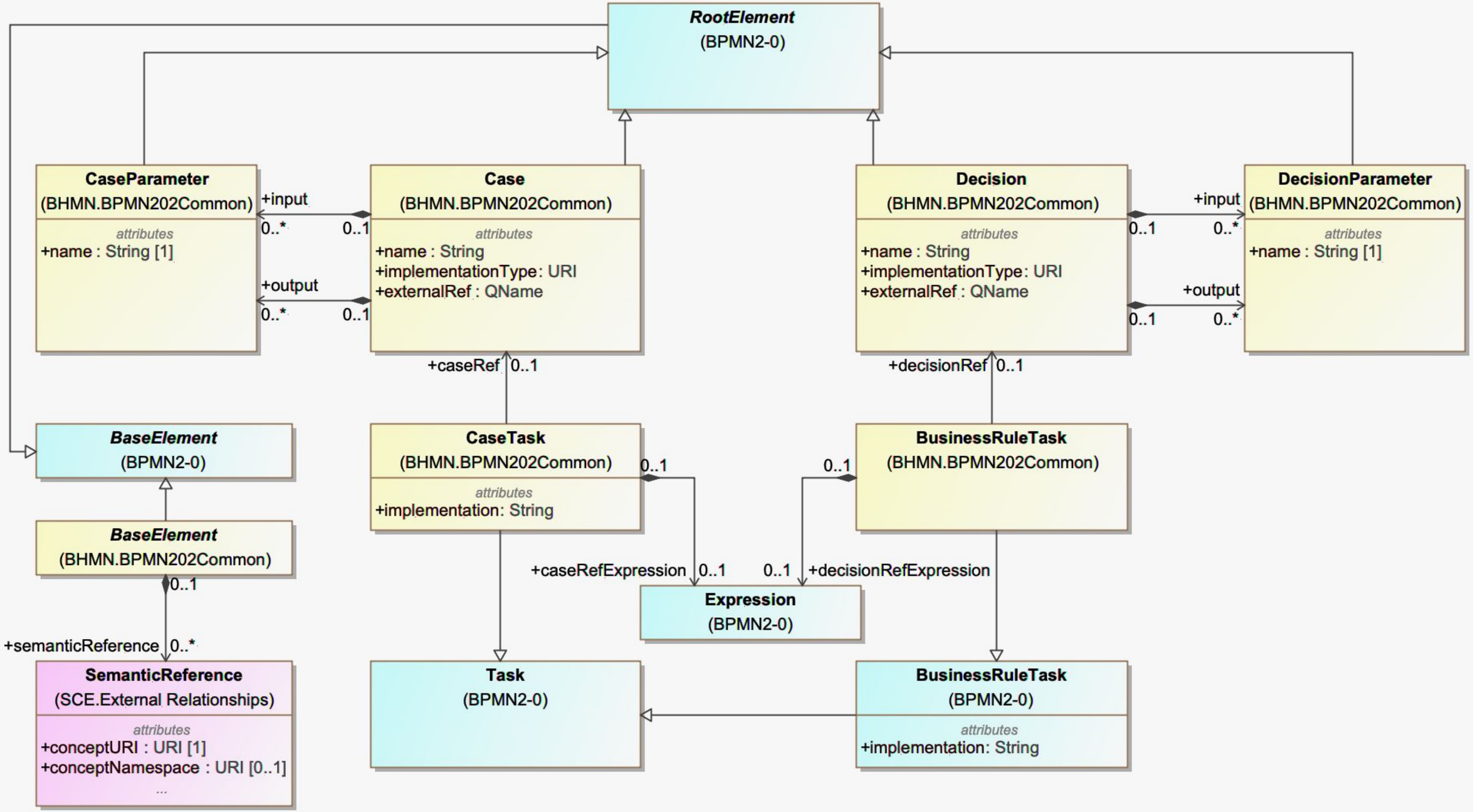


Link Business Rule Task to Decision



Order Discount | **Hit Policy:** Unique

	When	Then	
	Order Amount (long)	Discount (integer)	Annotations
1	<500	0	
2	[500..999]	2	
3	[1000..1999]	3	
4	[2000..4999]	5	
5	>=5000	8	


RootElement
(BPMN2-0)
CaseParameter
(BHMN.BPMN202Common)
attributes
+name : String [1]
+input
0..*
0..1
+output
0..*
0..1
Case
(BHMN.BPMN202Common)
attributes
+name : String
+implementationType: URI
+externalRef : QName
Decision
(BHMN.BPMN202Common)
attributes
+name : String
+implementationType: URI
+externalRef : QName
+input
0..1
0..*
+output
0..1
0..*
DecisionParameter
(BHMN.BPMN202Common)
attributes
+name : String [1]
+caseRef
0..1
+decisionRef
0..1
BaseElement
(BPMN2-0)
BaseElement
(BHMN.BPMN202Common)
0..1
+semanticReference
0..*
SemanticReference
(SCE.External Relationships)
attributes
+conceptURI : URI [1]
+conceptNamespace : URI [0..1]
...
CaseTask
(BHMN.BPMN202Common)
attributes
+implementation: String
0..1
+caseRefExpression
0..1
0..1
+decisionRefExpression
BusinessRuleTask
(BHMN.BPMN202Common)
Expression
(BPMN2-0)
Task
(BPMN2-0)
BusinessRuleTask
(BPMN2-0)
attributes
+implementation: String

History & Future of Process Modeling

before 2009

- BPMN 1.x Notation
- Workflow Patterns
- BPEL, WSDL, SOAP
- UML Activity Diagram
- Flow Charts, Petri Nets, YAWL, Workflow Nets

2010-2015

- BPMN 2.0 Model & Notation
- BPMN MIWG
- BPMN Extensions: Color, I18n, Decorator
- OCEB Certification
- CMMN 1.1

2016-2020

- DMN 1.x
- WfMC DMN TCK
- FEEL for BPMN
- OCEB 2 Certification
- CNCF Workflow

2021+

- BKPMN
- SDMN
- BHMN
- SCE
- PPMN

Appendix

Camunda – Der universelle Prozess-Orchestrator

CAMUNDA

Orchestrieren

Sie komplexe Prozessabläufe zwischen Menschen, Systemen und Geräten.

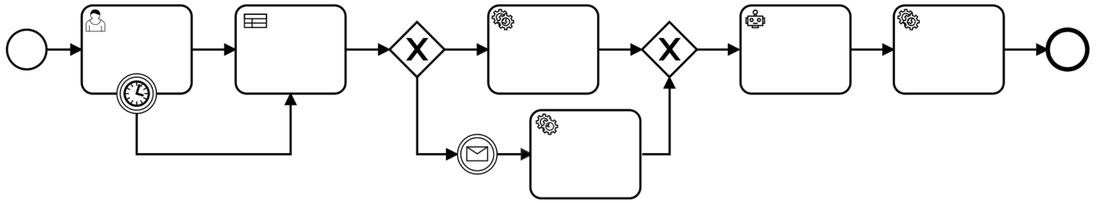
Automatisieren

Sie jeden Prozess, jeden Endpunkt, überall.

Digitale Transformation

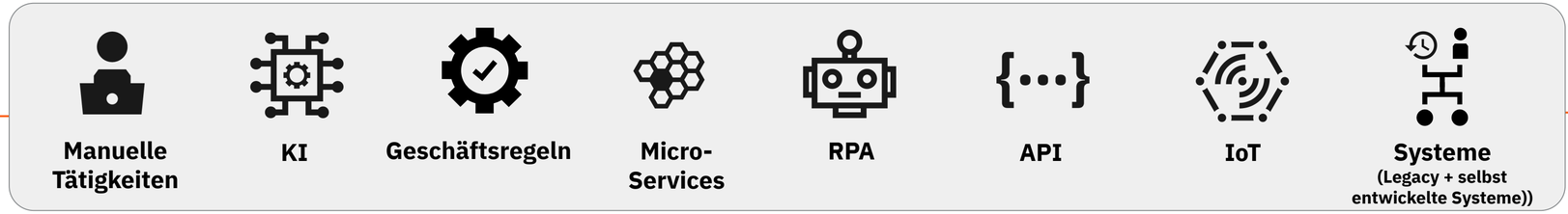
Bereiten Sie Ihr Unternehmen auf die Zukunft vor.

Zusammenarbeit



Flexibilität

Alle Endpunkte



Camunda Platform: Der universelle Prozess-Orchestrator

Design

Entwickler und Geschäftsanwender arbeiten zusammen, um Prozesse mit Camunda zu entwerfen und bereitzustellen.

Modeler

Geschäftsprozessdiagramme mit BPMN & DMN modellieren und bereitstellen

Verfügbar über Web und Desktop-App

Konnektoren

Out-of-the-Box-Integrationen zur einfachen Kommunikation mit gängigen Unternehmensanwendungen und -protokollen.

Integrations-Framework

Eigene Konnektoren zu jedem System erstellen und bereitstellen, inkl. selbst entwickelter und Legacy-Anwendungen.

Formulare

Drag & Drop-Erstellung von Formularen für Workflows, die menschliche Interaktion erfordern.

Automatisierung

Automatisierungsplattform für das Enterprise-Level. Entwickelt für die Komplexität heutiger Unternehmen, beliebt bei Entwicklern.

POWERED BY ZEEBE

Workflow Engine

Cloud-native Workflow Engine der nächsten Generation, die unvergleichliche Geschwindigkeit, Skalierbarkeit und Resilienz bietet.

Decision Engine

Echtzeit-Transparenz zur Überwachung, Analyse und Lösung von Problemen in allen Prozessinstanzen.

Tasklist

Aufgaben, die menschliche Interaktion erfordern, über benutzerfreundliche Formulare oder über Ihre eigenen Anwendungen mit der Tasklist-API zuweisen und ausführen.

Operate

Automatisieren Sie Entscheidungen in End-to-End-Geschäftsprozessen über DMN.

Optimierung

Teams erhalten die benötigten Einblicke, um die Probleme bei den Geschäftsprozessen anzugehen, die sich am stärksten auf den ROI auswirken.

Optimize

Erhalten Sie die Einblicke, die Sie benötigen, um Ihre Geschäftsprozesse zu verstehen und kontinuierlich zu verbessern.

Über Camunda

2008

Gegründet

300+

Mitarbeiter weltweit

100.000+

Community-Mitglieder

6

Niederlassungen weltweit:
Amerika, Asien und Europa

500+

Unternehmenskunden

190+

Länder mit Camunda-Nutzern