"CUSTOMS PROCESS"

Customs Export Process

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Process Management and Mining A.Y. 2023/2024

Export from the EU

The process concerns the Customs Process of the export of goods from the European Union according to the Union Customs Code (UCC)

https://www.adm.gov.it
https://eur-lex.europa.eu
https://taxation-customs.ec.europa.eu

Process Description

An **economic operator** within the European Union starts the process by contacting the **customs office of export**

The **office of export** together with the **customs office of exit** manages the entire process of customs clearance of goods from the country of entry to the country of exit

Customs has the task of **verifying the documentation** provided, **analyse the risks** and carrying out the **controls on the goods**

Actors

Declarant

He provides the necessary documentation to **start the procedure**, s/he is updated by thecustoms on the progress steps of the process at the end of which it receives the goods

Customs

It is responsible for **checking** the documentation and the goods, managing any inconsistencies. It is divided into **Export Office** and **Exit Office**, which respectively manage the initial phase of the export process and the final phase of the exit of goods.

Carrier

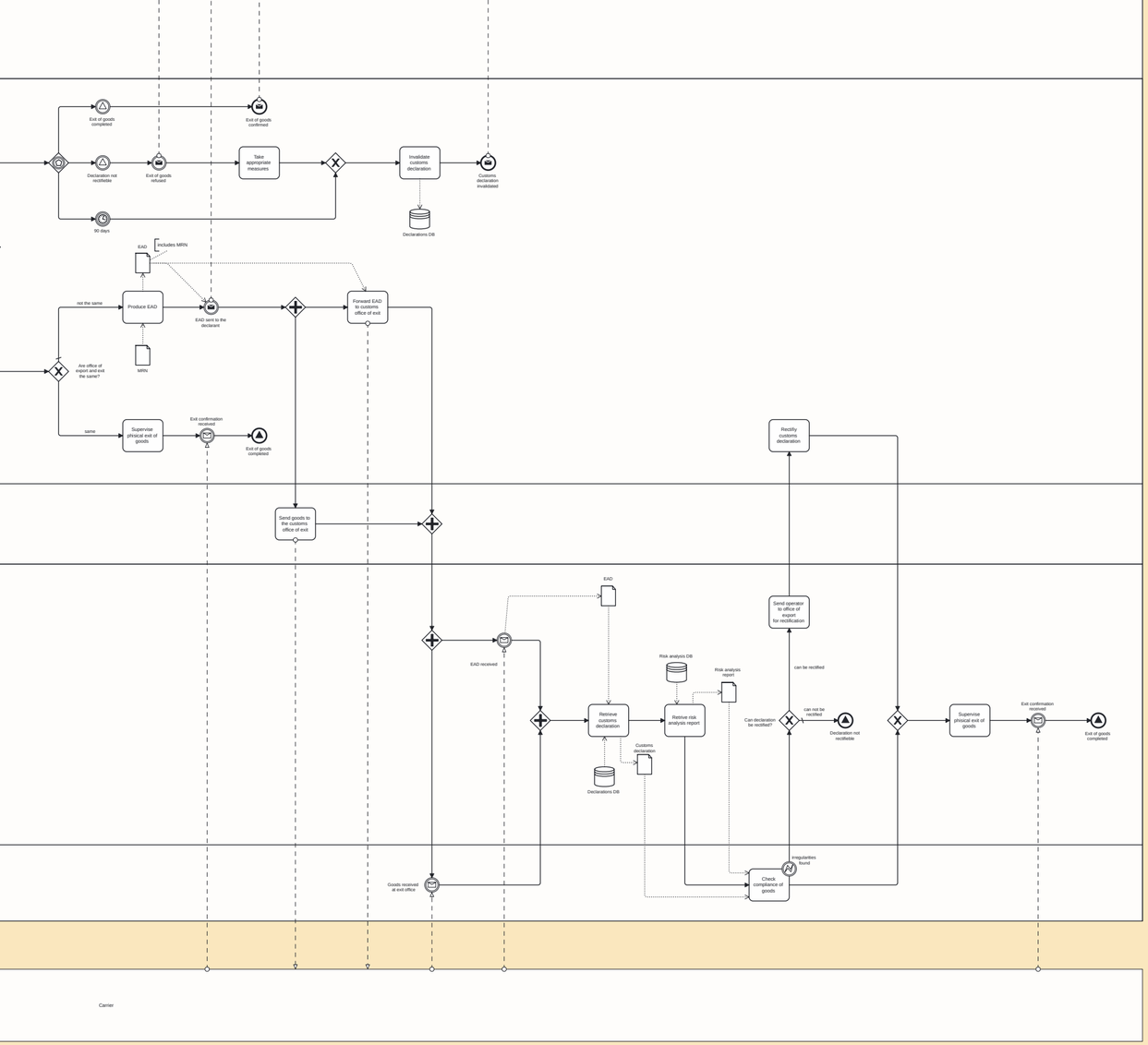
He is responsible for the **delivery of the goods** at the offices of export and exit of the customs, and if necessary he provides the **documentation for the transport** between the two offices

Project Phases

1. Modelling
2. Analysis
3. Execution
4. Robotic Process Automation
5. Process Mining

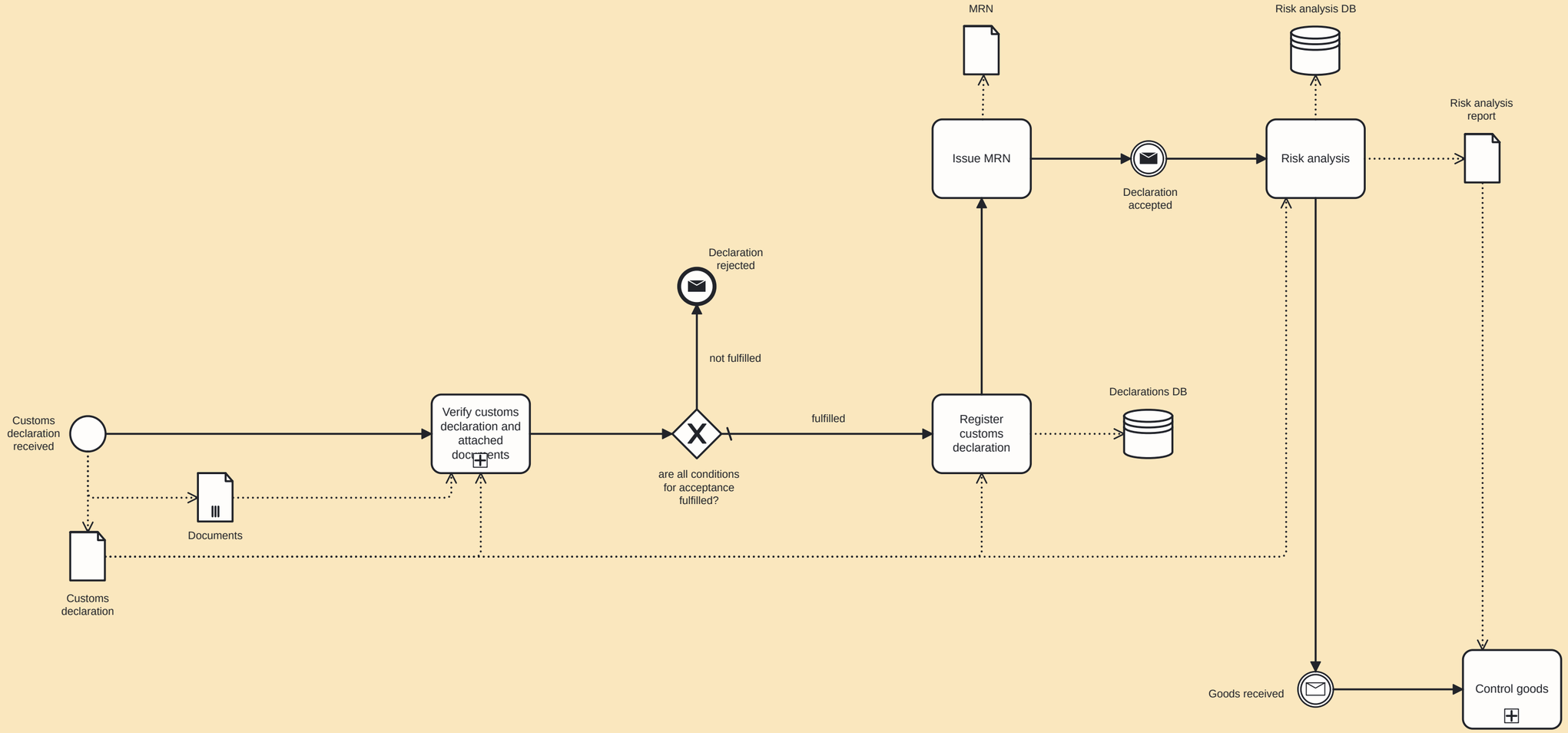
Process Modelling

BPMN.iO


Exit of goods completed
Exit of goods confirmed
Declaration not rectifiable
Exit of goods refused
Take appropriate measures
Invalidate customs declaration
Customs declaration invalidated
Declarations DB
90 days
EAD
includes MRN
not the same
Produce EAD
EAD sent to the declarant
Forward EAD to customs office of exit
Are office of export and exit the same?
MRN
same
Supervise physical exit of goods
Exit confirmation received
Exit of goods completed
Send goods to the customs office of exit
Rectify customs declaration
Send operator to office of export for rectification
EAD
EAD received
Risk analysis DB
Risk analysis report
can be rectified
Retrieve customs declaration
Retrive risk analysis report
Can declaration be rectified?
can not be rectified
Declaration not rectifiable
Customs declaration
Declarations DB
Supervise physical exit of goods
Exit confirmation received
Exit of goods completed
Goods received at exit office
Irregularities found
Check compliance of goods
Carrier

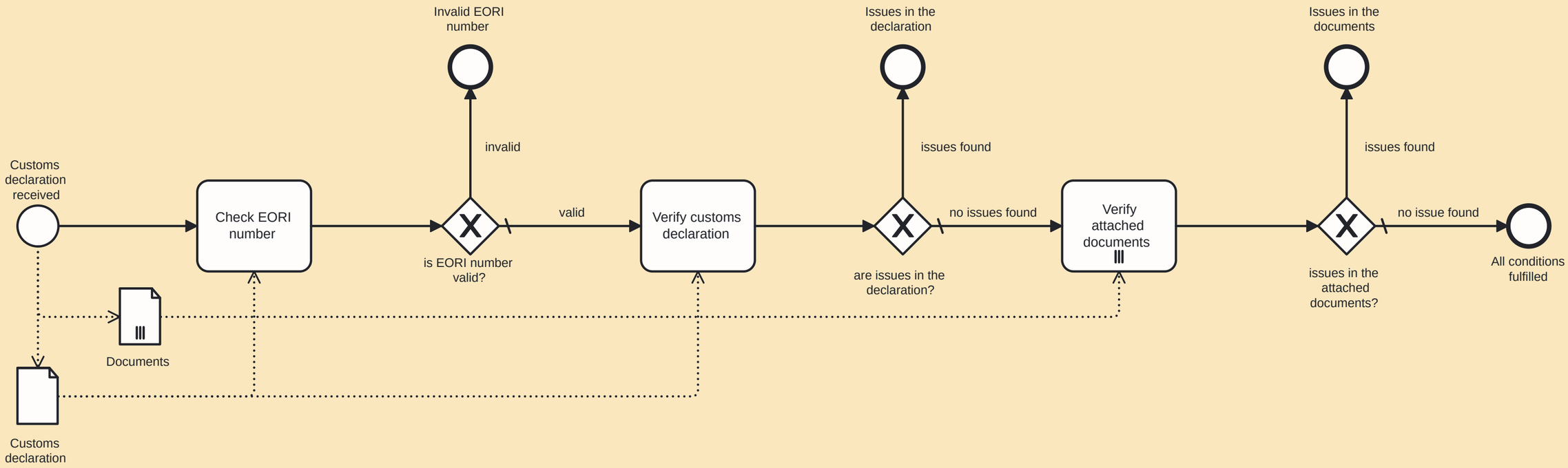
Process Model

Formalities at the office of export



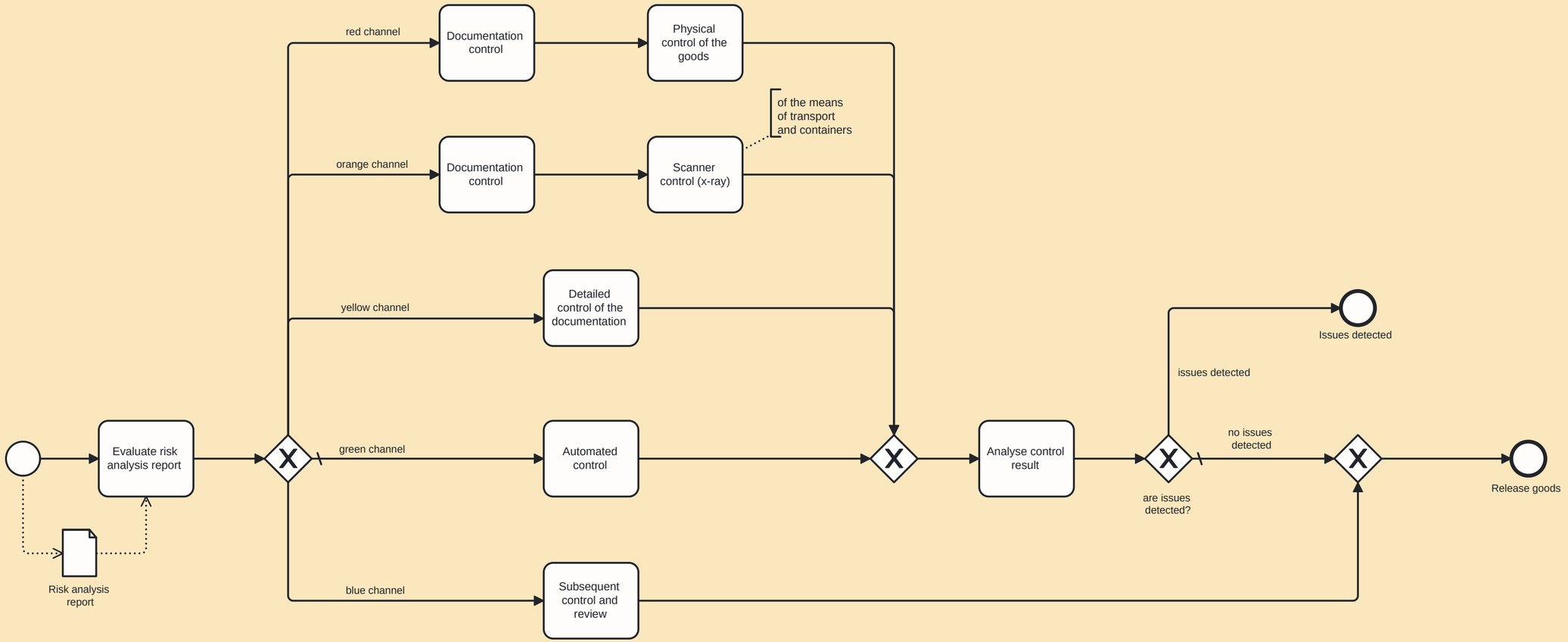
Process Model

Subprocess: Verify customs declaration and attached documents



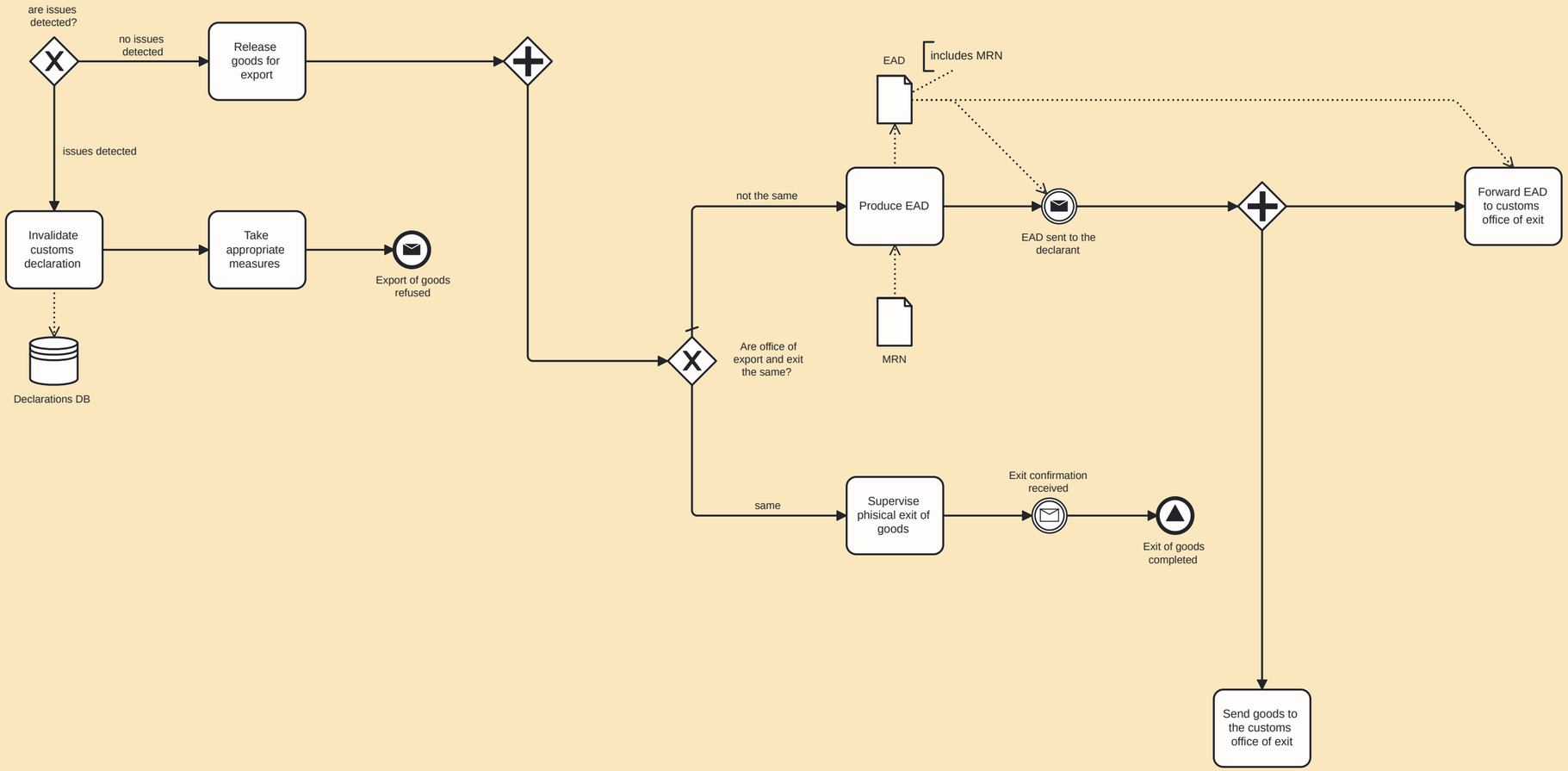
Process Model

Subprocess: Control of goods



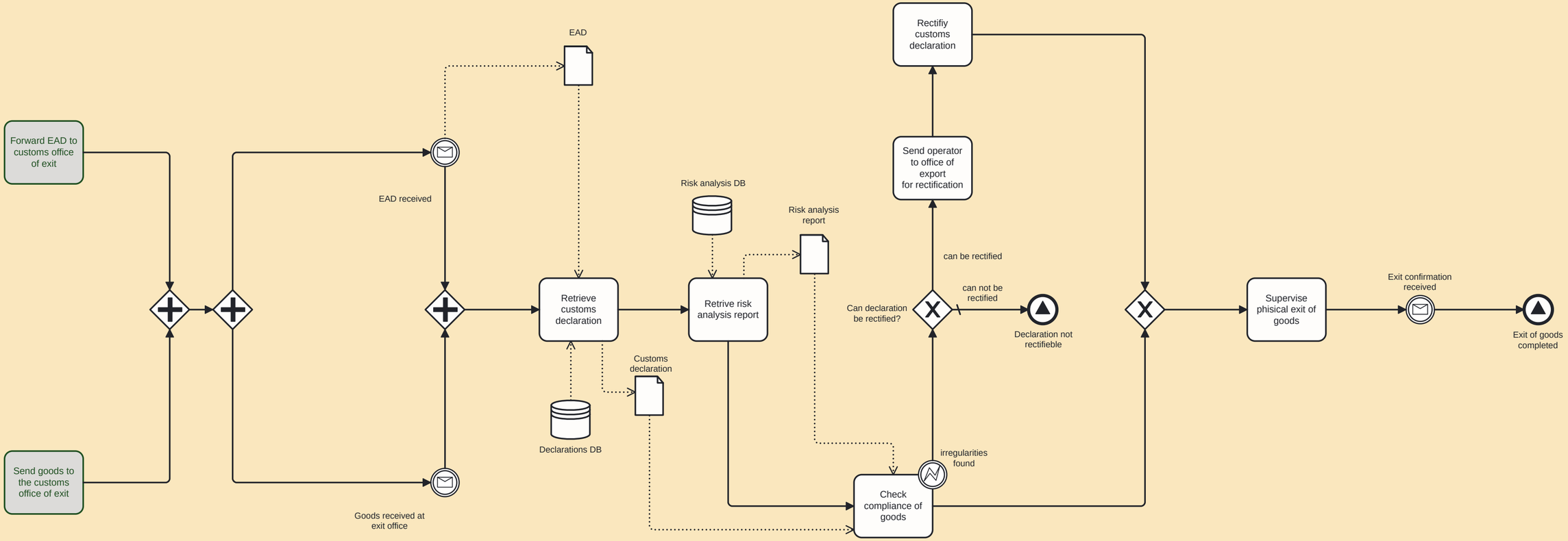
Process Model

Release for export



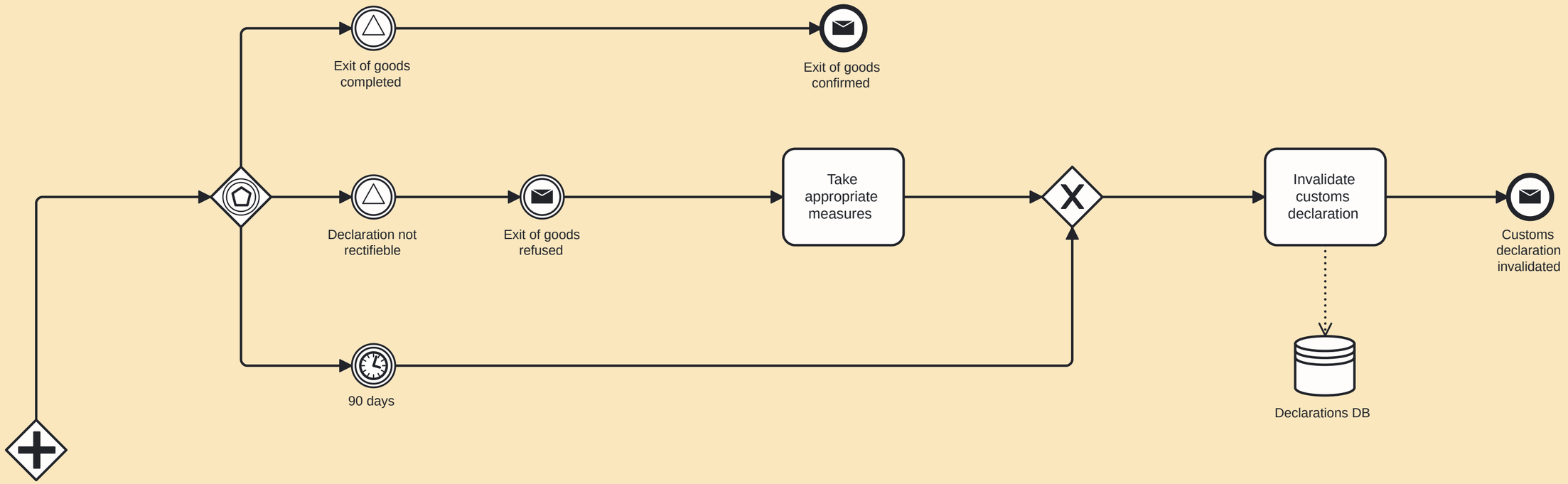
Process Model

Formalities at the office of exit



Process Model

Process termination



Process Analysis

SIGNAVIO

BIMP
powered by QBP Engine

Simulation Details

01

Model simplification

- Redefine activities
- No message flows
- Exceptions are excluded

02

Process Analysis

- Define processing time for each step
- Conditional branching probabilities
- Arrival rate and probability of distribution

03

Definition of KPIs

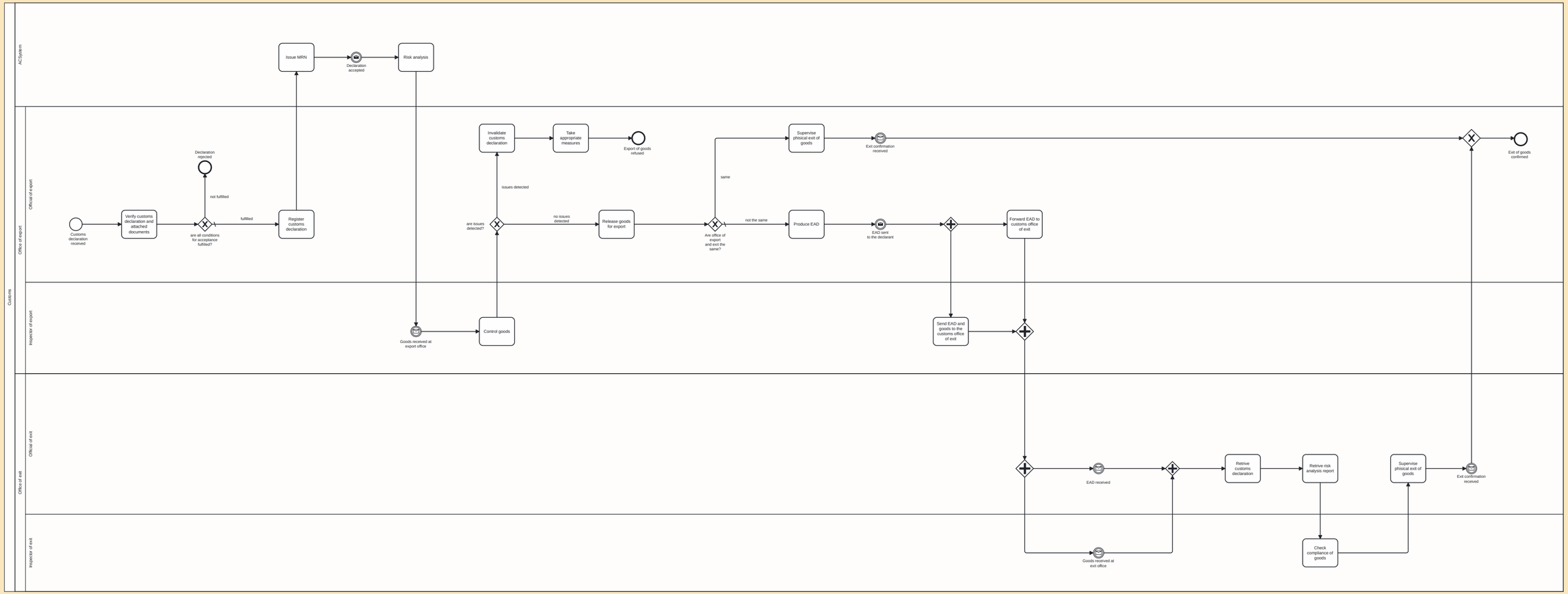
- Cycle Time
- Resource Utilization
- Average Costs per Scenario
- Average Waiting Time

04

Simulation

Simplified model

Simplified version of the original model for the next phases



Processing Times of Activities (1)

Activity	Distribution Function	Mean	Standard Deviation	Resource
Verify customs declaration and attached documents	Exponential	30 min	-	Official of Export
Register customs declaration	Normal	8 min	2 min	Official of Export
Issue MRN	Fixed	1 sec	-	ACSystem
Risk analysis	Fixed	1 min	-	ACSystem
Control goods	Exponential	40 min	-	Inspector of Export
Invalidate customs declaration	Normal	4 min	2 min	Official of Export
Take appropriate measures	Exponential	20 min	-	Official of Export
Release goods for export	Normal	10 min	2 min	Official of Export

Processing Times of Activities (2)

Activity	Distribution Function	Mean	Standard Deviation	Resource
Supervise phisical exit of goods (export)	Normal	10 min	5 min	Official of Exit
Produce EAD	Normal	4 min	2 min	Official of Export
Forward EAD to customs office of exit	Fixed	1 sec	-	Official of Export
Send goods to the customs office of exit	Normal	10 min	5 min	Inspector of Export
Retrive customs declaration	Fixed	1 min	-	Official of Exit
Retrive risk analysis report	Fixed	1 min	-	Official of Exit
Check compliance of goods	Exponential	20 min	-	Inspector of Exit
Supervise phisical exit of goods (exit)	Normal	10 min	5 min	Official of Export

Process Analysis - Basis

Branching Probabilities

Are office of export and exit the same?

- 80% - No
- 20% - Yes

Are all conditions for acceptance fulfilled?

- 5% - No
- 95% - Yes

Are issues detected?

- 5% - No
- 95% - Yes

Inter Arrival Time

Distribution Function	Mean	Number of Instances
Exponential	55 min	1000

Resources : Scenario As-Is

ACSystem

Mon-Sun: 00:00 – 00:00

1 resource

1 €/hour

Office of Export

Export Official

Mon-Fri: 09:00 – 17:00

5 people

30 €/hour

Export Inspector

Mon-Fri: 09:00 – 15:00

4 people

20 €/hour

Office of Exit

Exit Official

Mon-Fri: 09:00 – 17:00

5 people

30 €/hour

Exit Inspector

Mon-Fri: 09:00 – 15:00

2 people

20 €/hour

*costs refer to individual people

Simulation Purpose and KPIs

Our objective is to find the most efficient trade-off between the Total Cost and the Average Cycle Time, taking into consideration also the resources utilization, the waiting times and the presence of bottlenecks.

Process Costs

Average Total Cost of the entire process for each instance

Cycle Time

Average Cycle Time of the entire process for each instance

Waiting times

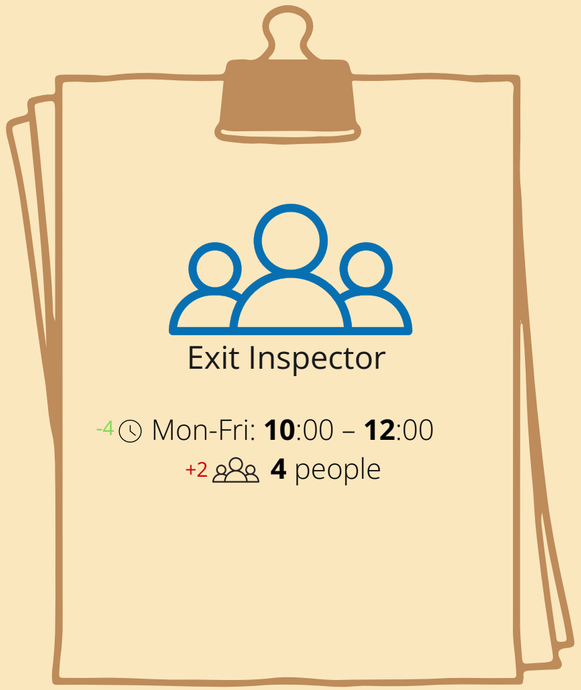
Average Waiting Times across the entire process for each instance

Resource Utilization

The amount of resources involved in the entire Cycle Time

Scenarios

Scenario A



Exit Inspector

-4 Mon-Fri: **10**:00 – **12**:00
+2 **4** people

Bottleneck fixed on
Check compliance of goods

Scenario B

Exit Official

-4 Mon-Fri: **10**:00 – **14**:00
-2 **2** people

Export Inspector

Mon-Fri: 09:00 – 15:00
+1 **5** people

Resource Utilization
increased for Exit Official

Scenario C

Export Official

-3 Mon-Fri: 09:00 – **15**:00
-1 **4** people

Cost of a Process Instance decreases

Scenario D

Mon-**Sat**

Working Schedule
extended until
Saturday for every
actors

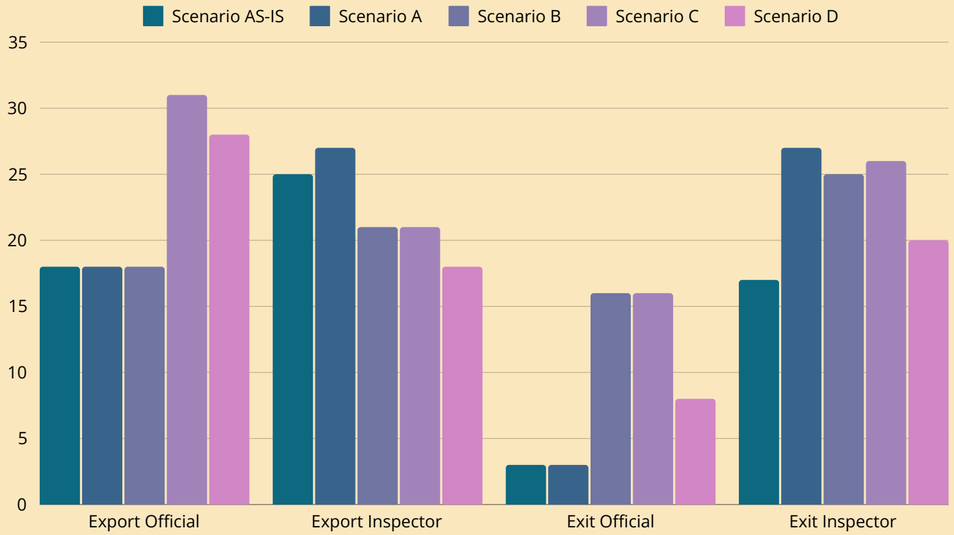
UPDATE

Results

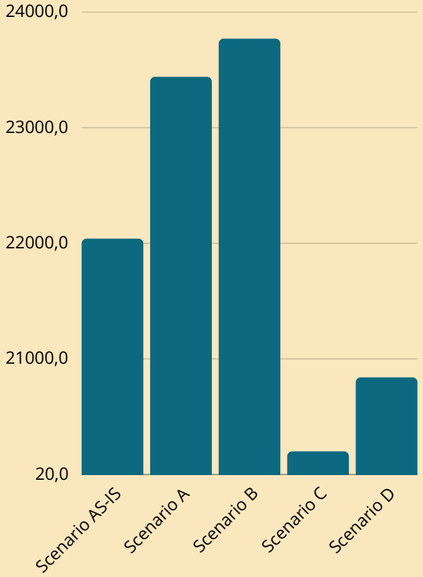
Average Process Instance		Scenario AS-IS	Scenario A	Scenario B	Scenario C	Scenario D
Costs		220,40 €	**234,40 €** ↑	237,70 €	**202,00 €** ↓	208,40 €
Cycle Times including off-timetable hours		3,5 d	3,6 d	3,6 d	**3,9 d** ↑	**3,1 d** ↓
Waiting Times		1,1 h	**33,5 m** ↓	31 m	31 m	32 m
Resource Utilization Export	Official	18 %	18 %	18 %	**31 %** ↑	28%
	Inspector	25 %	27 %	21 %	21 %	18 %
Resource Utilization Exit	Official	3,0 %	3,0 %	**16 %** ↑	16 %	8,2 %
	Inspector	17 %	**27 %** ↑	25 %	26 %	20%

Charts

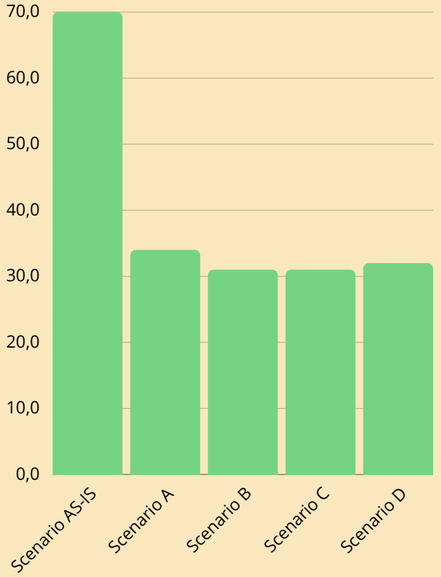
Resource Utilizaton



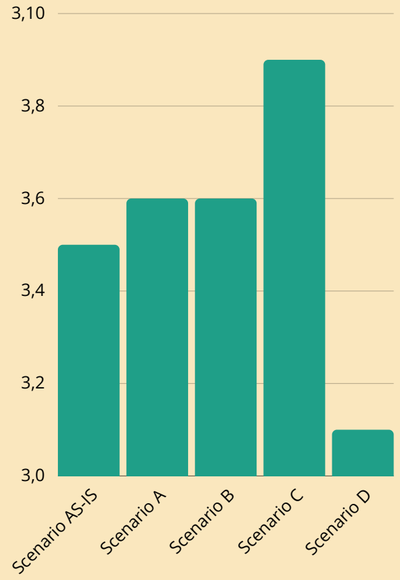
Average Costs



Average Waiting Times



Average Cycle Times



Process Execution

bizagi

01
Process Model

02
Data Model

03
Form

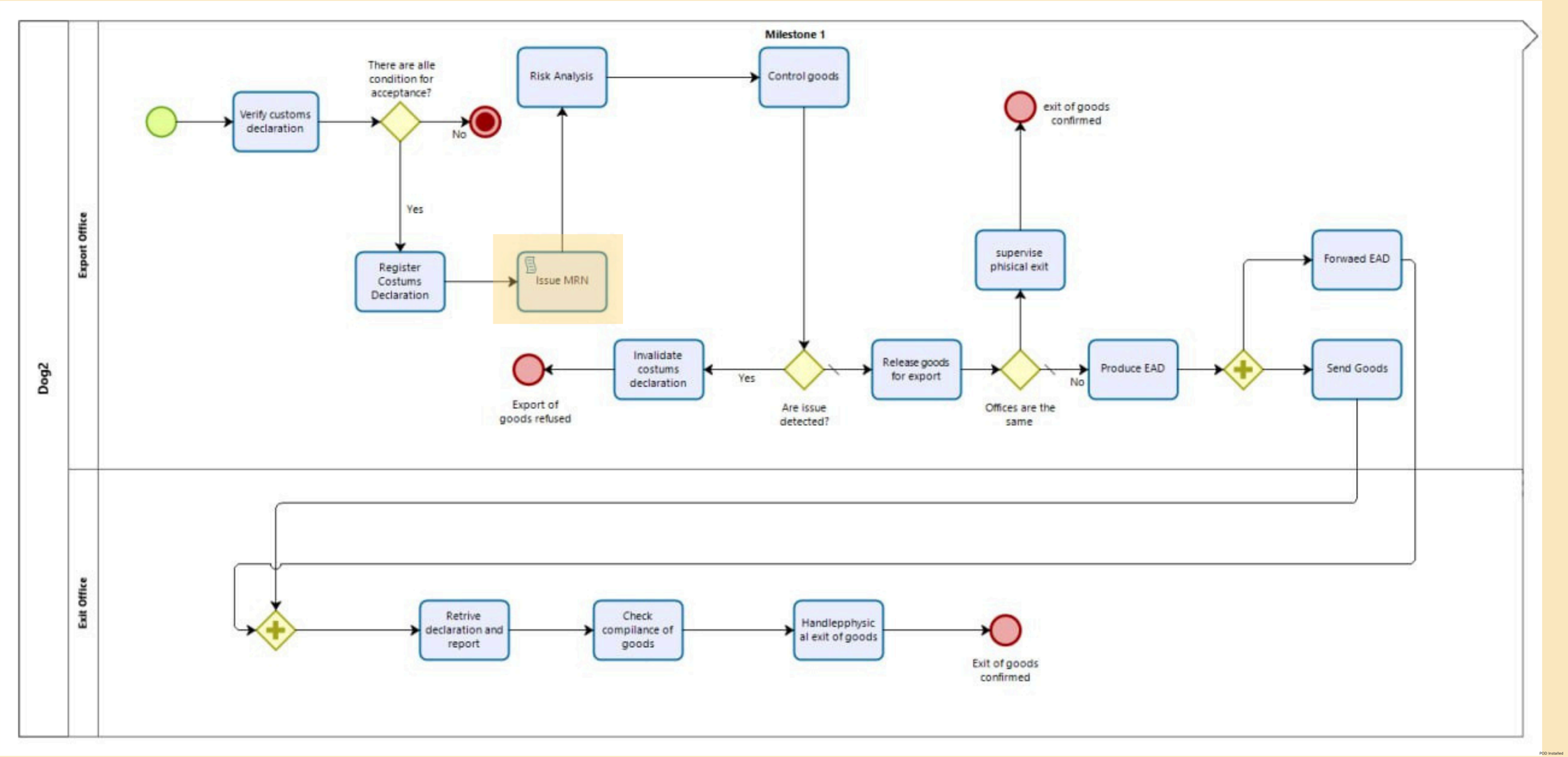
04
Business Rules

05
Performers

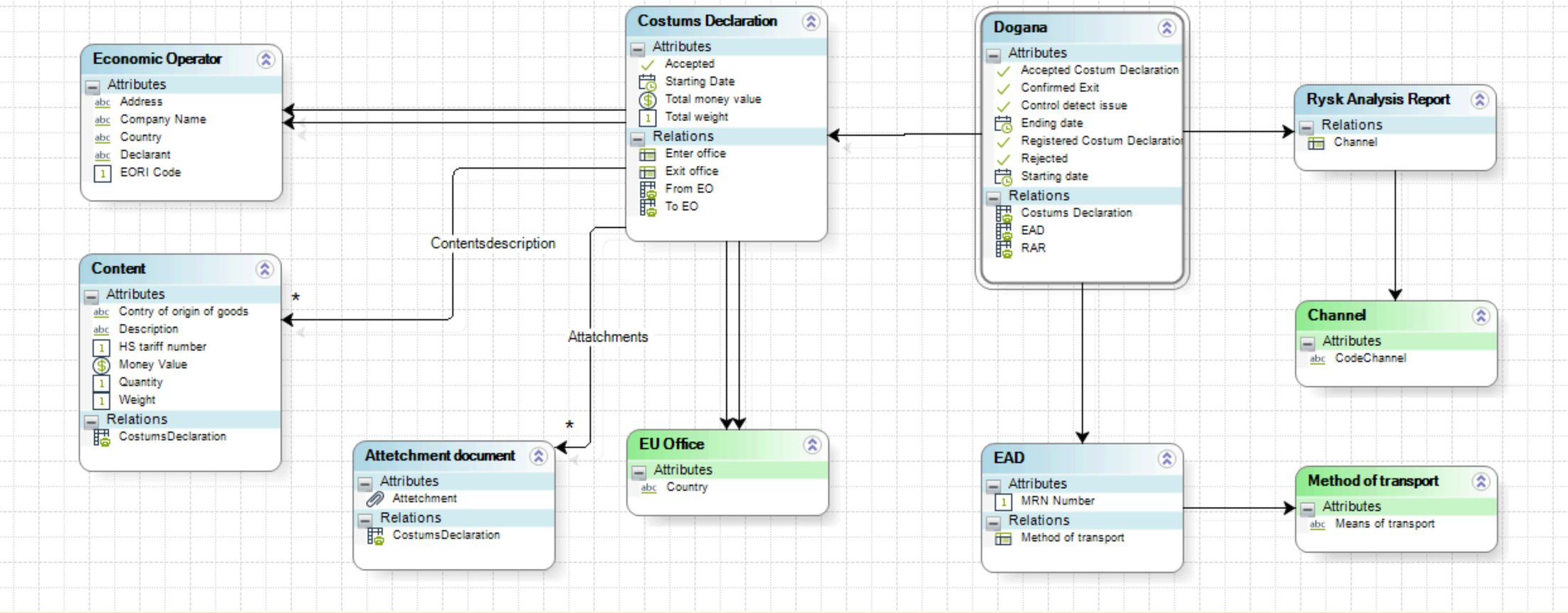
06
Execution

Execution Components

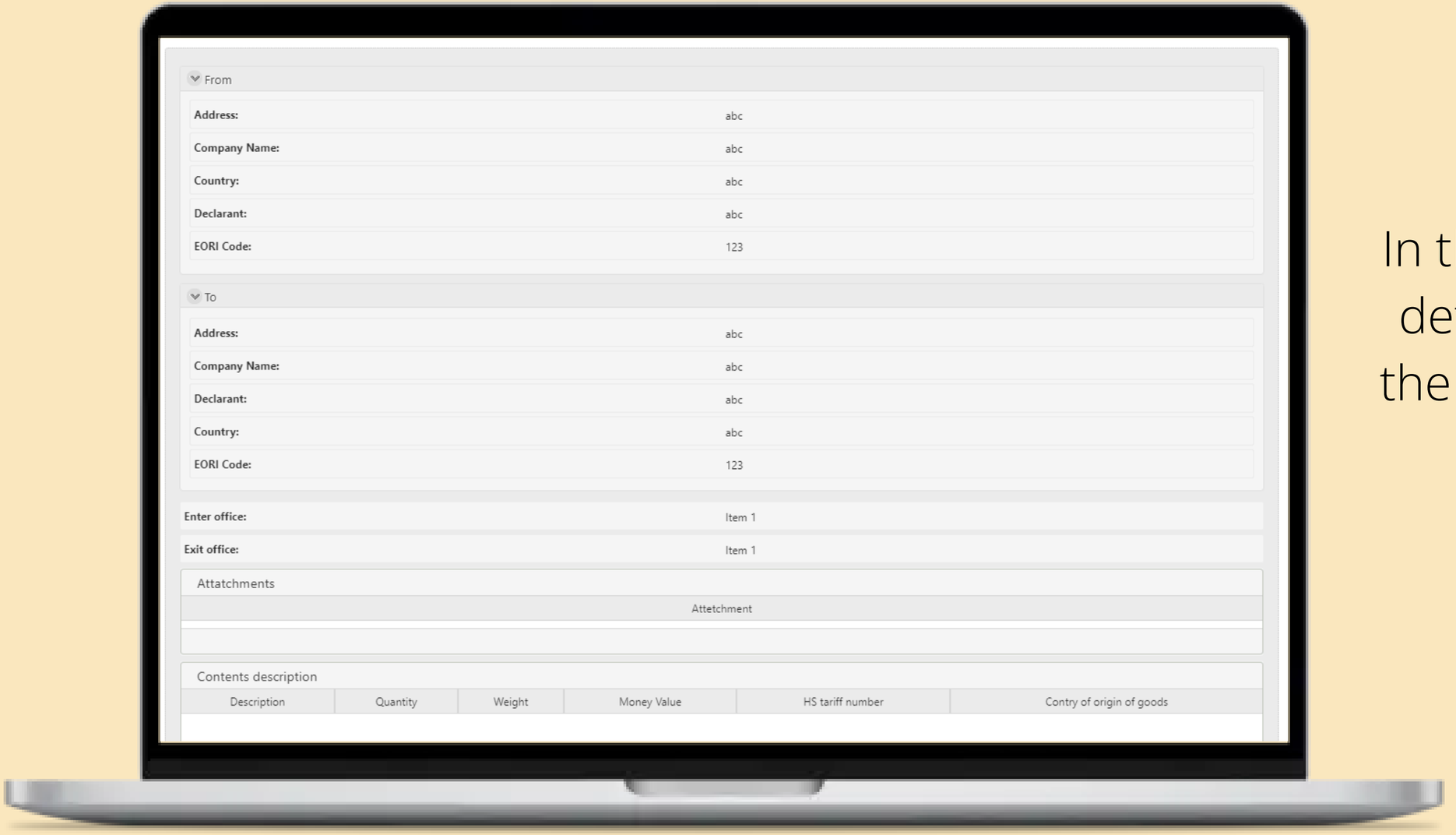
Process Model



Data Model

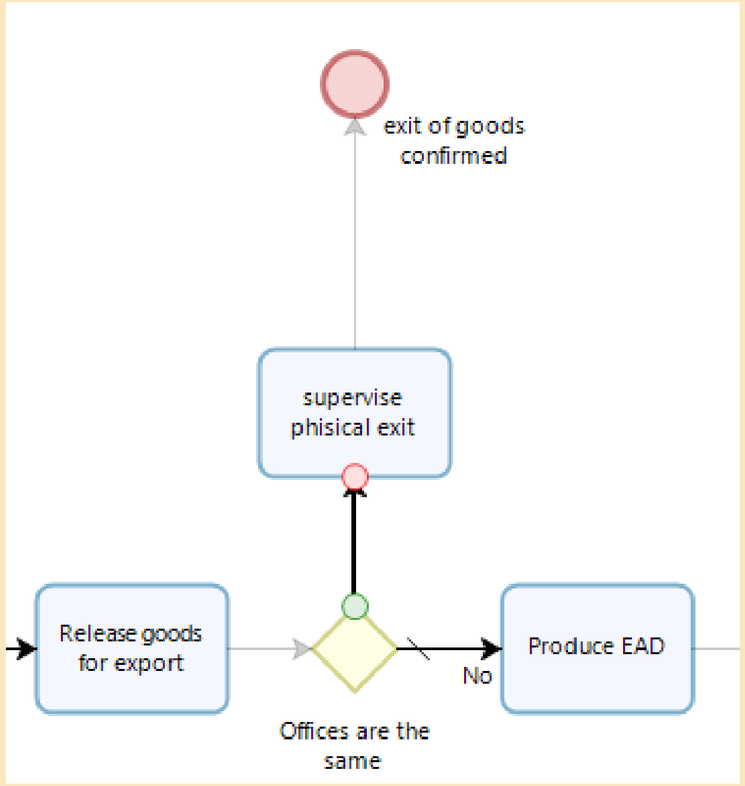

Costums Declaration
Attributes
Accepted
Starting Date
Total money value
Total weight
Relations
Enter office
Exit office
From EO
To EO
Economic Operator
Attributes
Address
Company Name
Country
Declarant
EORI Code
Dogana
Attributes
Accepted Costum Declaration
Confirmed Exit
Control detect issue
Ending date
Registered Costum Declaratio
Rejected
Starting date
Relations
Costums Declaration
EAD
RAR
Rysk Analysis Report
Relations
Channel
Channel
Attributes
CodeChannel
Content
Attributes
Contry of origin of goods
Description
HS tariff number
Money Value
Quantity
Weight
Relations
CostumsDeclaration
Contentsdescription
Attatchments
*
*
Attetchment document
Attributes
Attetchment
Relations
CostumsDeclaration
EU Office
Attributes
Country
EAD
Attributes
MRN Number
Relations
Method of transport
Method of transport
Attributes
Means of transport

Forms



In this step, we have defined the UIs for the user tasks of the process.

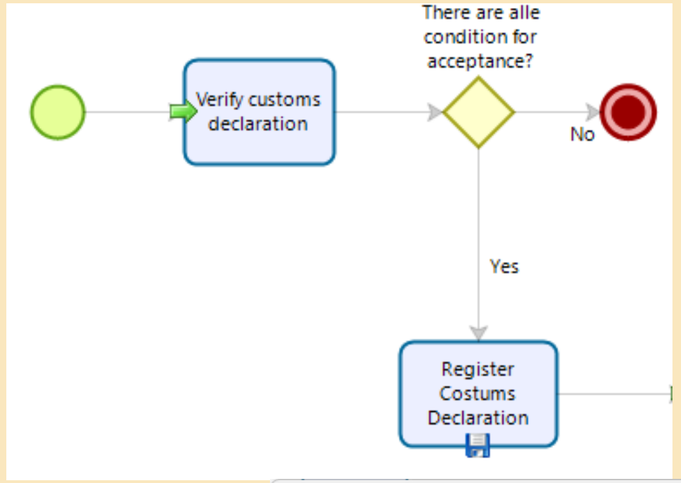
Business Rules

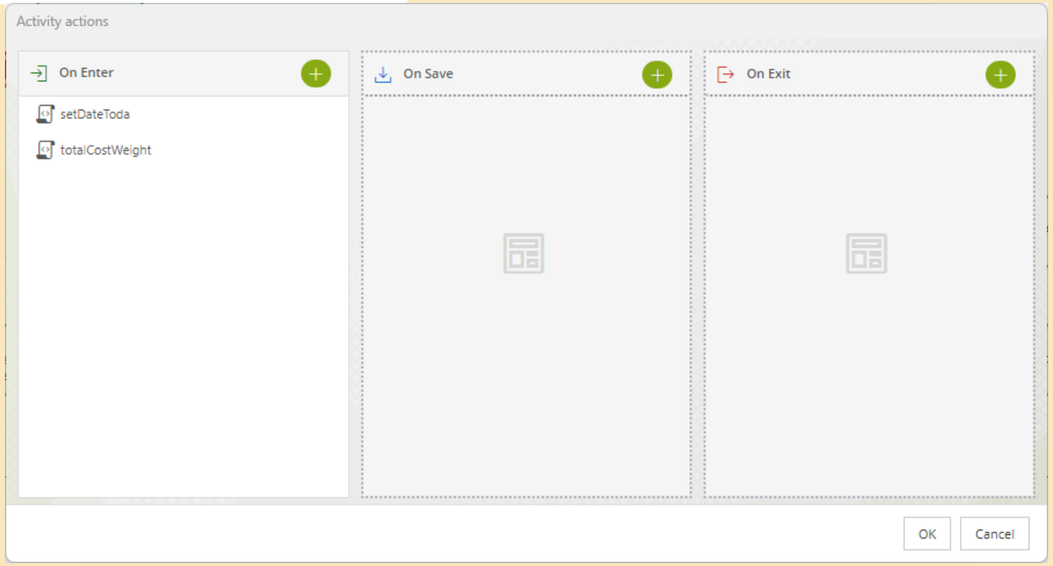


Expressions, defining the control flow and the behavior of the business.

Dogana.CostumsDeclaration.Enteroffice is equal to Dogana.CostumsDeclaration.Exitoffice

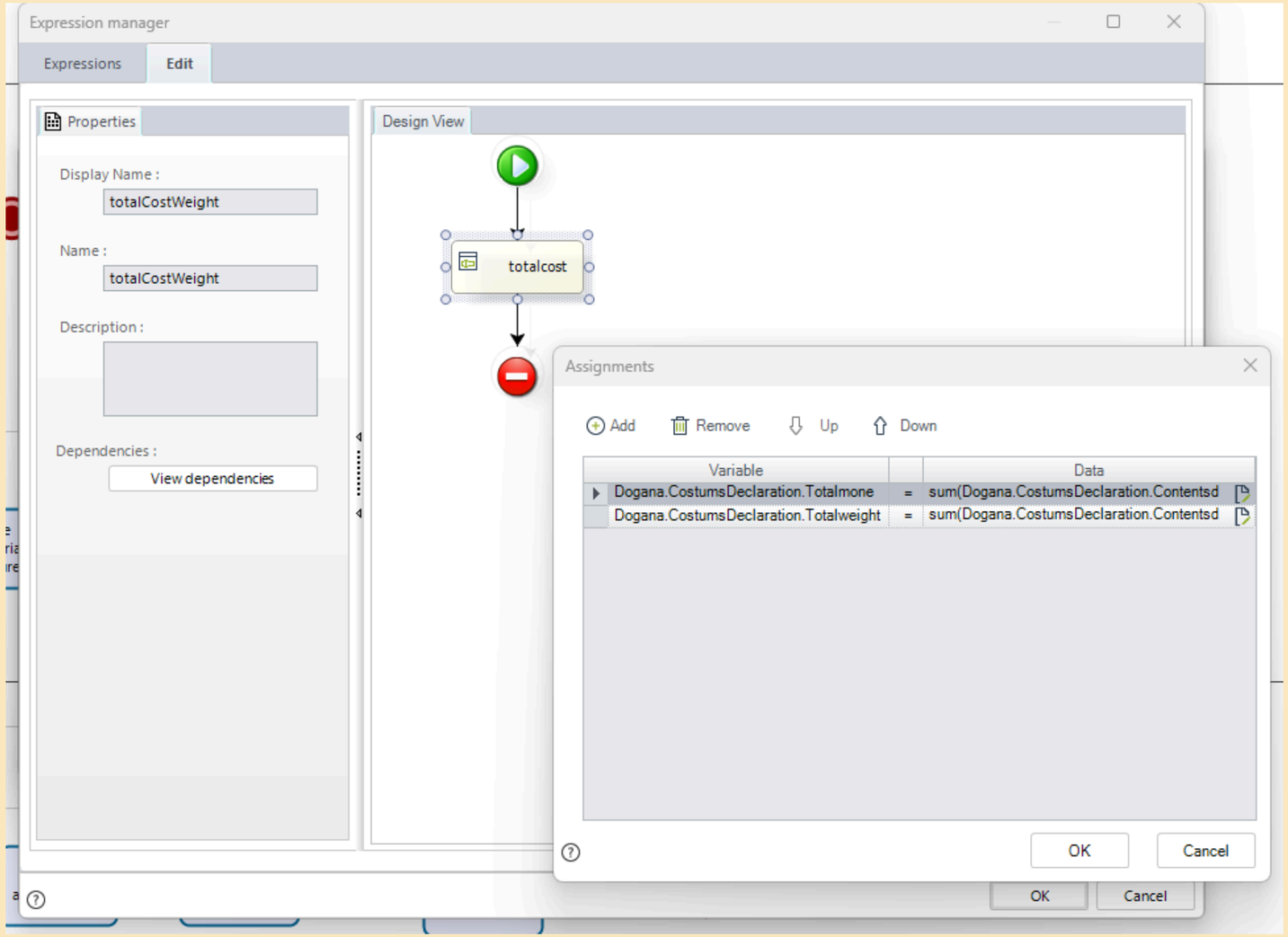
Business Rules





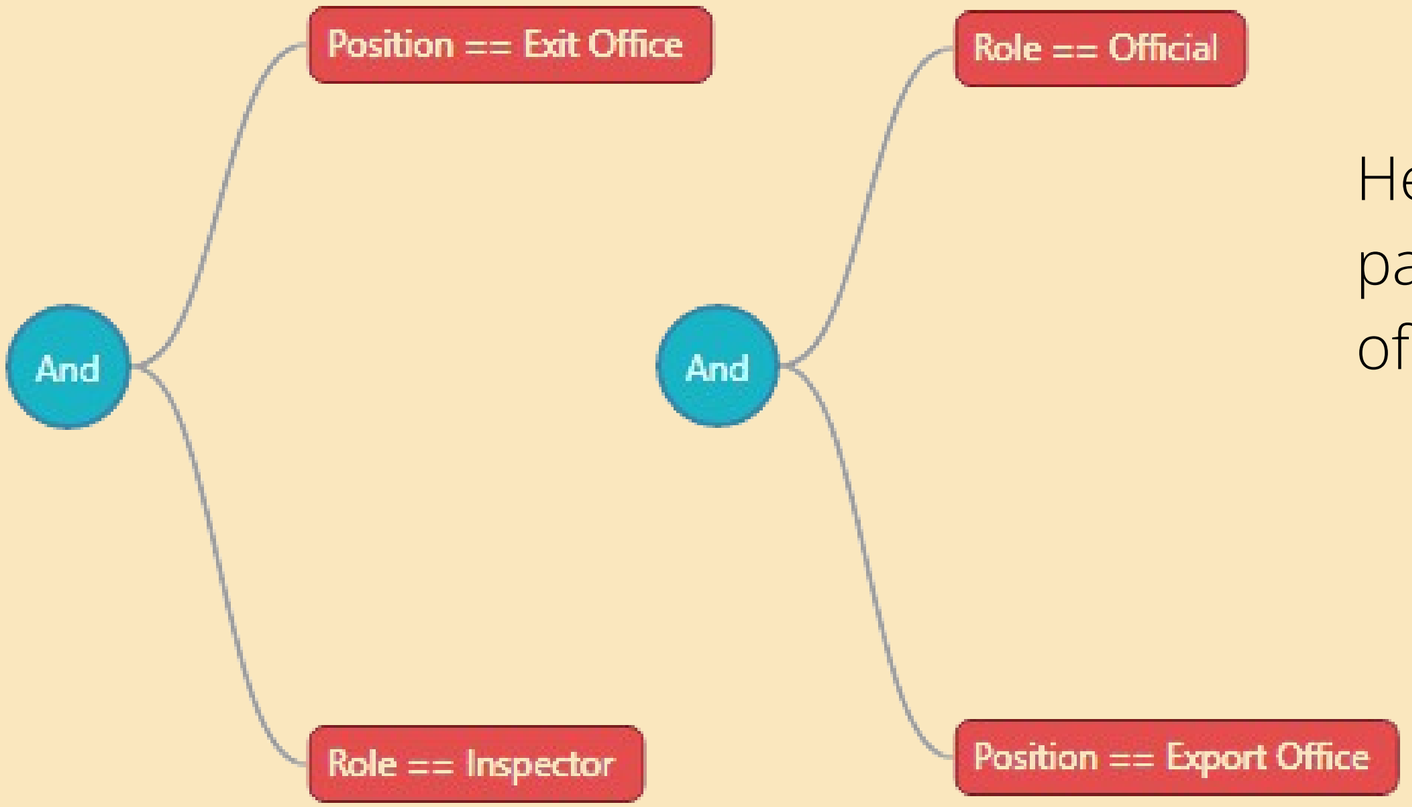
Activity Actions, perform data calculations (set Date, calculate total value, etc.)

Business Rules



Activity Actions, perform data calculations (set Date, calculate total value, etc.)

Performers



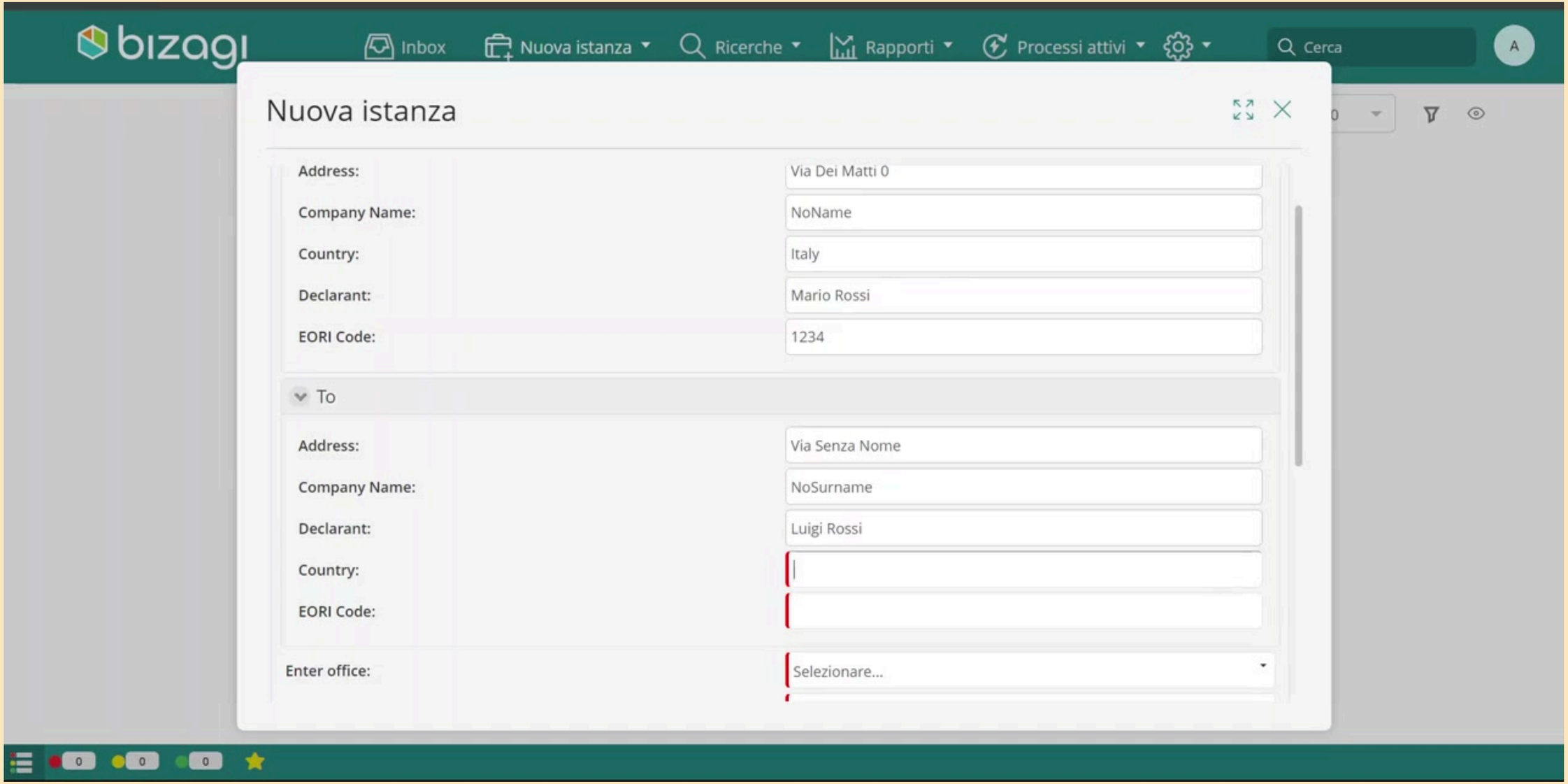
Here, we have defined the participants for each activity of the process.

Performers

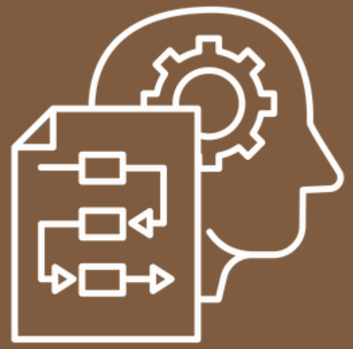
ID	Nome utente	Nome e cognome	Dominio
1	admon	admon	domain
3	ExitOfficial	Marcello	domain
103	ExportOfficial	Michele	domain
106	ExitInspector	Marco	domain
114	ExportInspector	Paolo	domain

Here, we have defined the participants for each activity of the process.

Execution

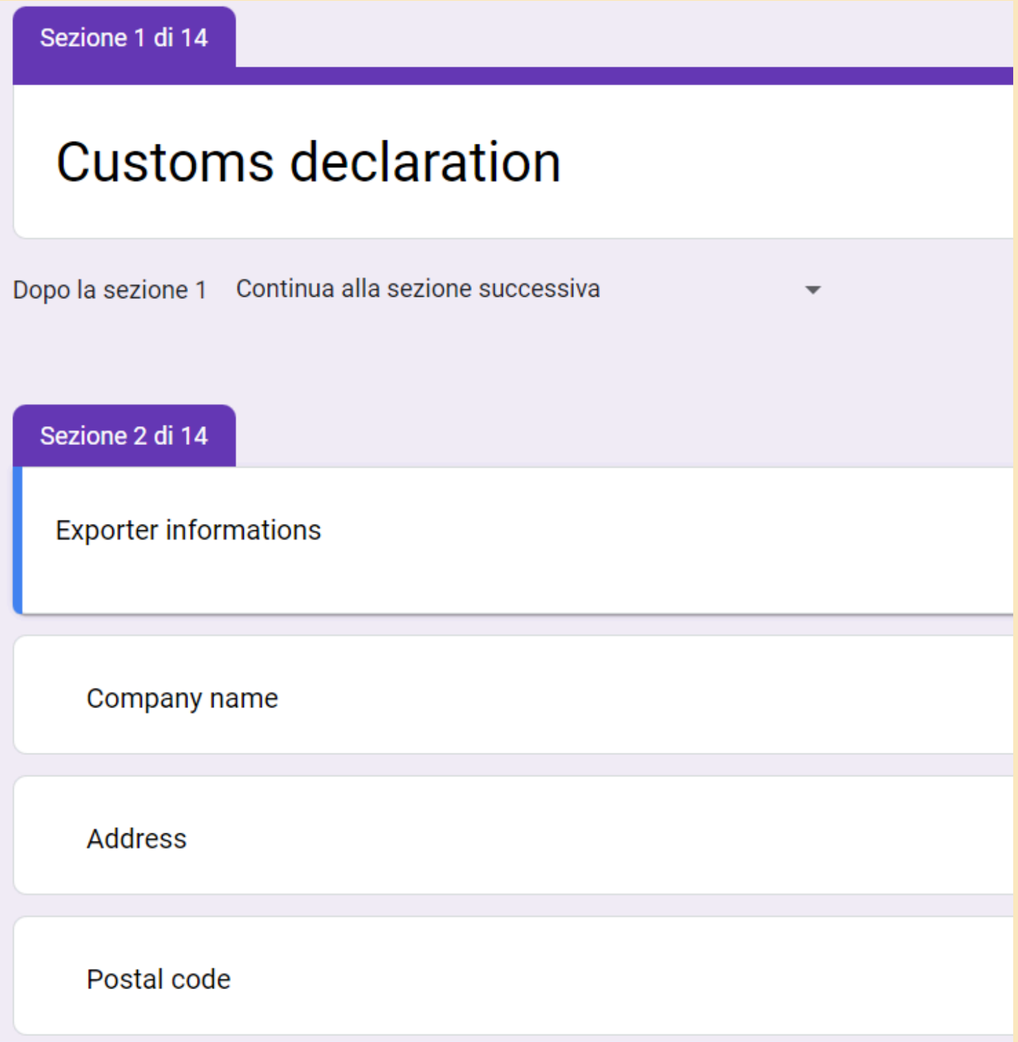

bizagi
Inbox
Nuova istanza
Ricerche
Rapporti
Processi attivi
Cerca
A
Nuova istanza
Address:
Via Dei Matti 0
Company Name:
NoName
Country:
Italy
Declarant:
Mario Rossi
EORI Code:
1234
To
Address:
Via Senza Nome
Company Name:
NoSurname
Declarant:
Luigi Rossi
Country:
EORI Code:
Enter office:
Selezionare...
0
0
0

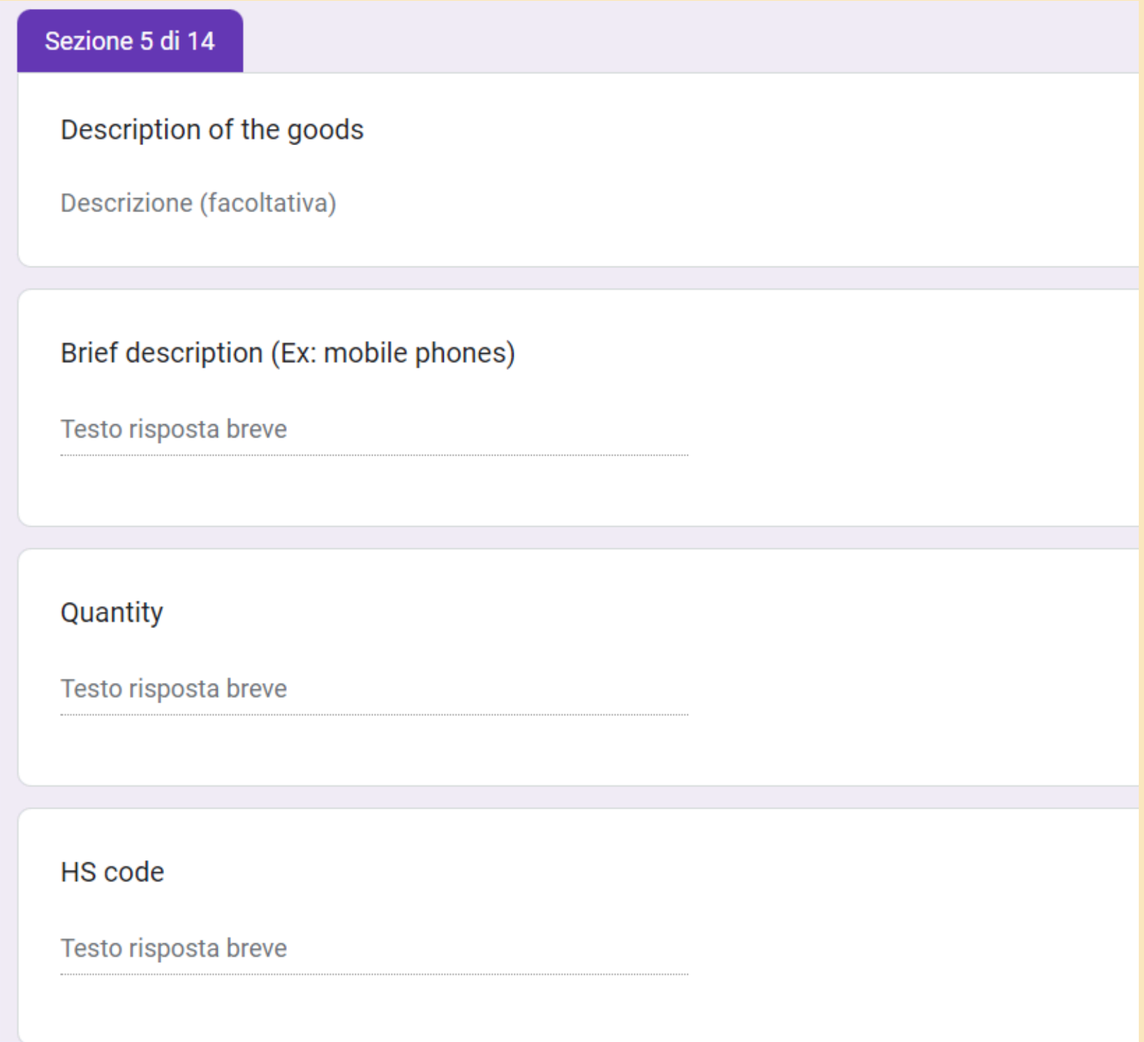
Robotic Process Automation



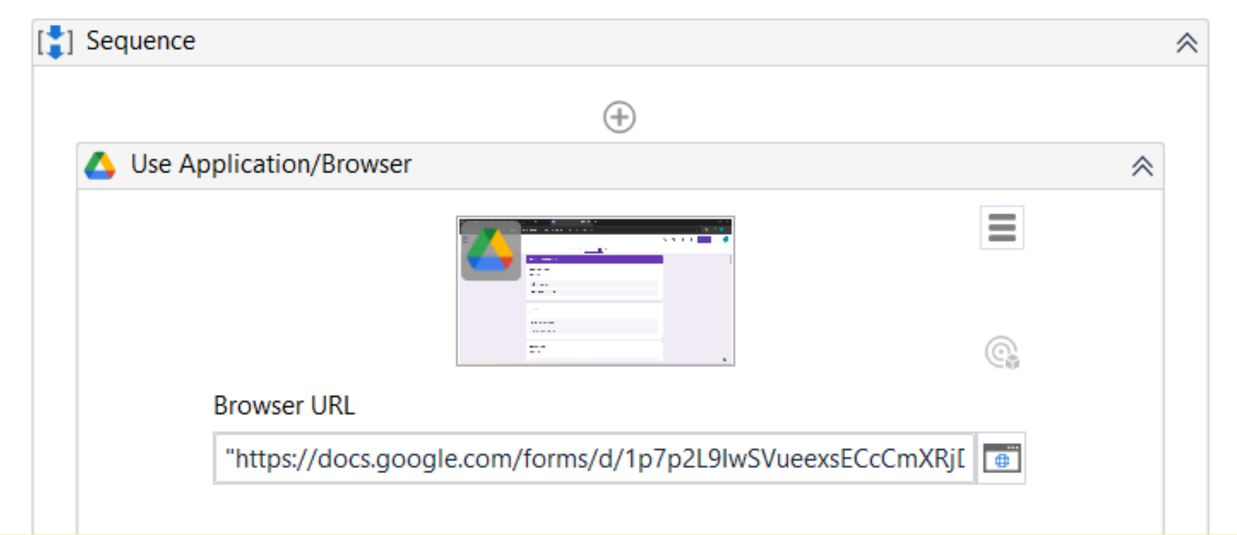
UiPath™

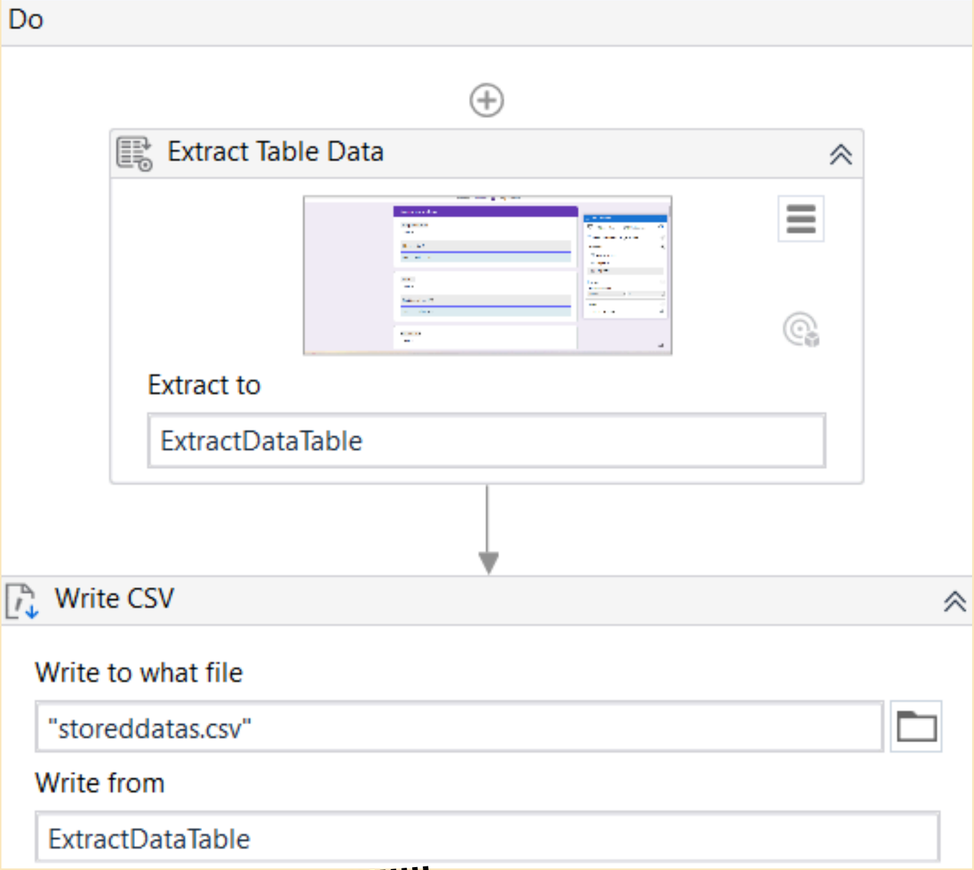
RPA - From a google form...



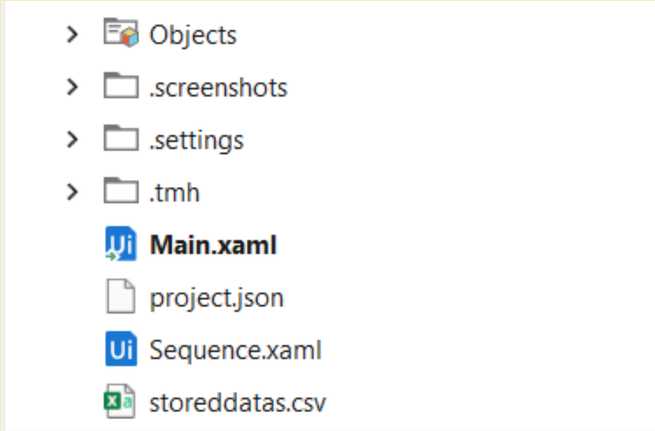


...To datas stored in tables





- Thanks to UiPath automation tools



RPA - Results

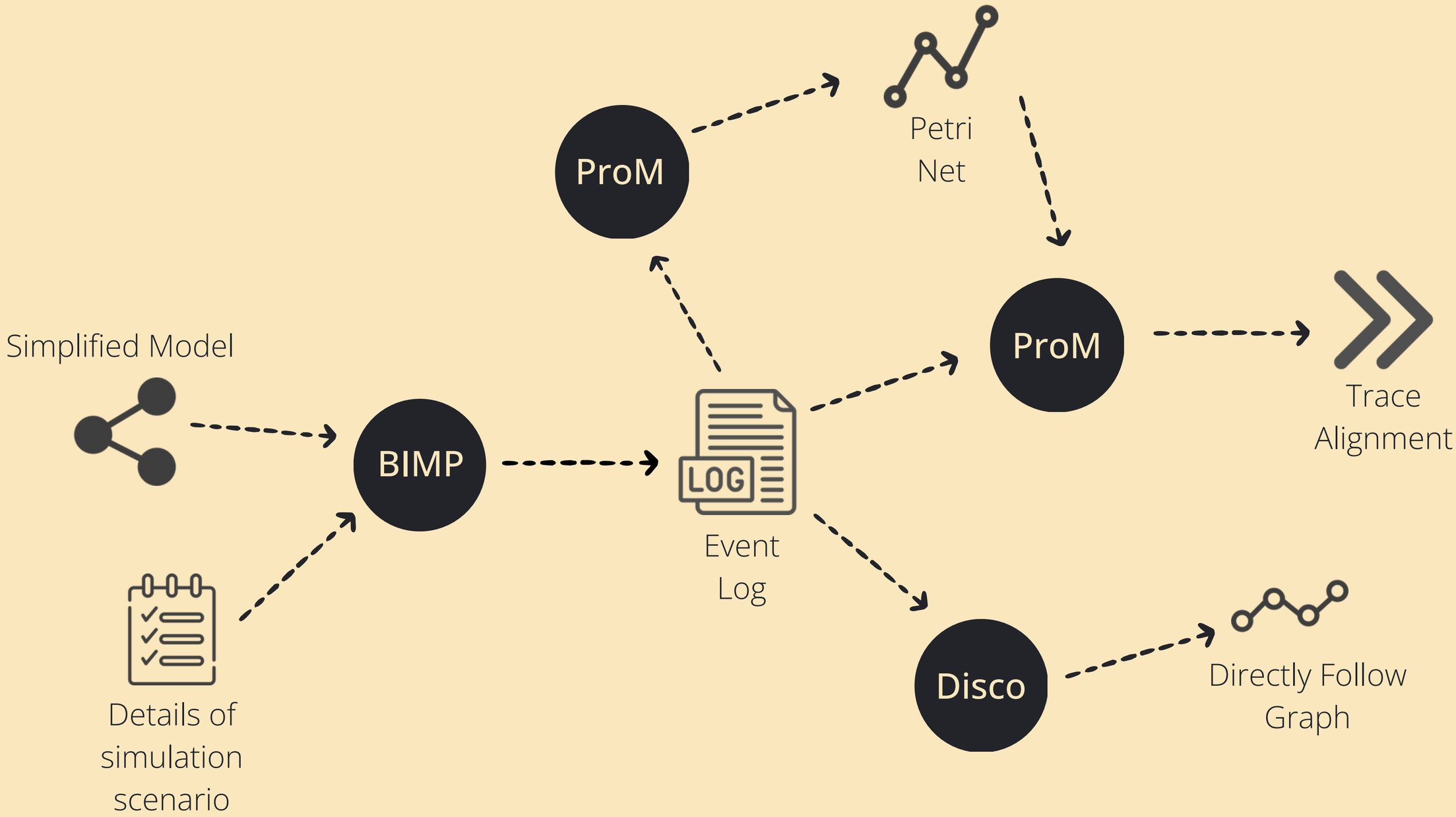
Requested info.	Response	Response1
Company name	Clothing S.p.A.	DragonTech Co., Ltd.
Address	Fictitious street 175	123 Zhongshan Road
Postal code	EC4	200000
City	London	Shanghai
Country	England	China
Telephone number	1,2E+08	+86 21 1234 5678
Email	Clothing200@email.eu	info@dragontech.com
Company name	Sasanelli S.n.c.	EuroTech Solutions corporation
Address	Via Fanelli 224	456 Avenue des Champs-Élysées
Postal code	70125	75008
City	Bari	Parigi
Country	Italy	Francia
Telephone number	3,9E+09	+33 1 2345 6789
Email	sasanelli@gmail.com	info@eurotechsolutions.fr
Tracking number	SDF345678912ZXY	ABC123456789TRE
Shipping date	########	########
Brief description (Ex: mobile phones)	High-necked wool sweaters	latest-generation smartphone
Quantity	35	500
HS code	6101.53.00	8517.12
Net weight	3.5 kg	100
Gross weight	6 kg	167
Measurement's unit (Ex: kilograms)	kilograms	Kilograms
Declared value	2800 euros	250000 euros
Goods' country of origin	China	

Process Mining

Disco
by Fluxicon

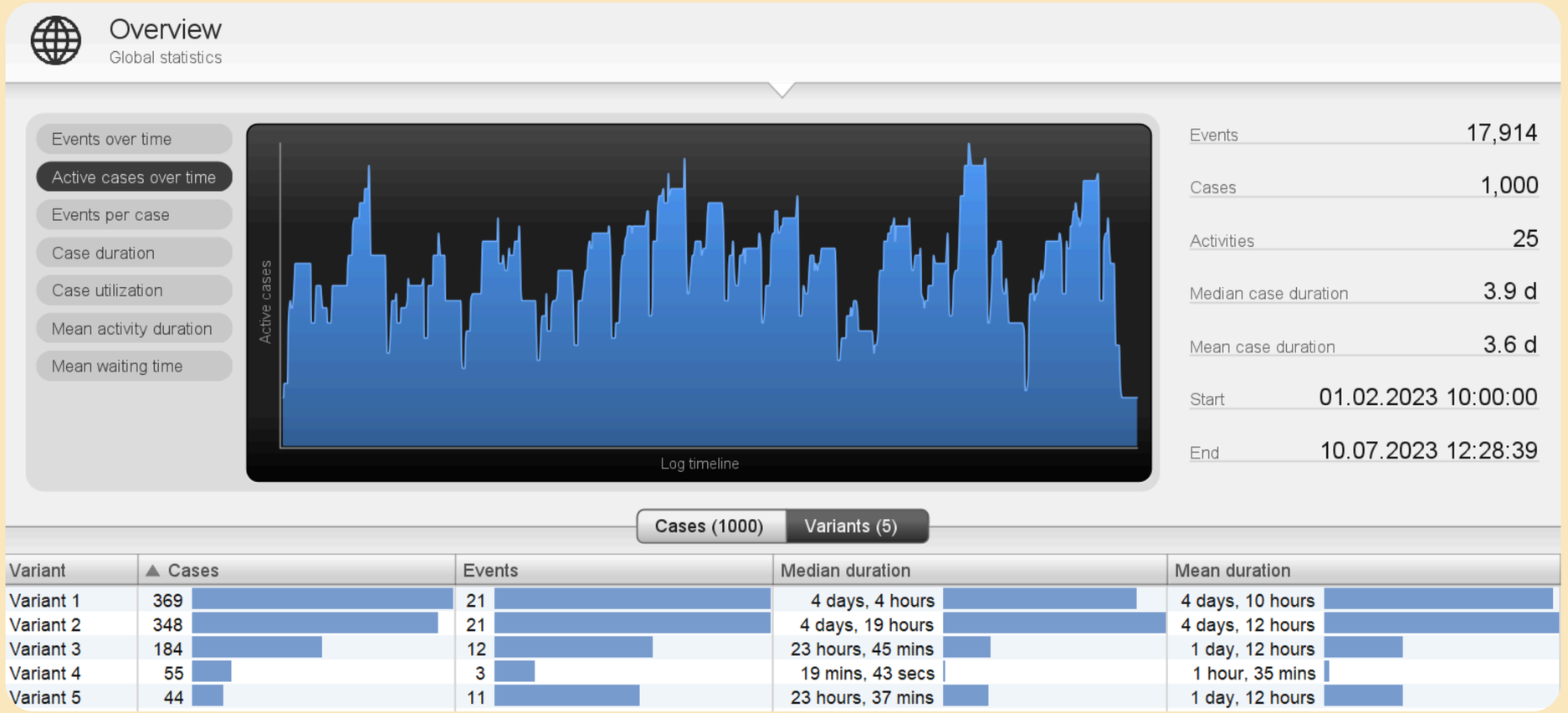
BIMP
powered by QBP Engine

ProM
process mining workbench


Simplified Model
BIMP
Details of simulation scenario
LOG
Event Log
ProM
Petri Net
ProM
Trace Alignment
Disco
Directly Follow Graph

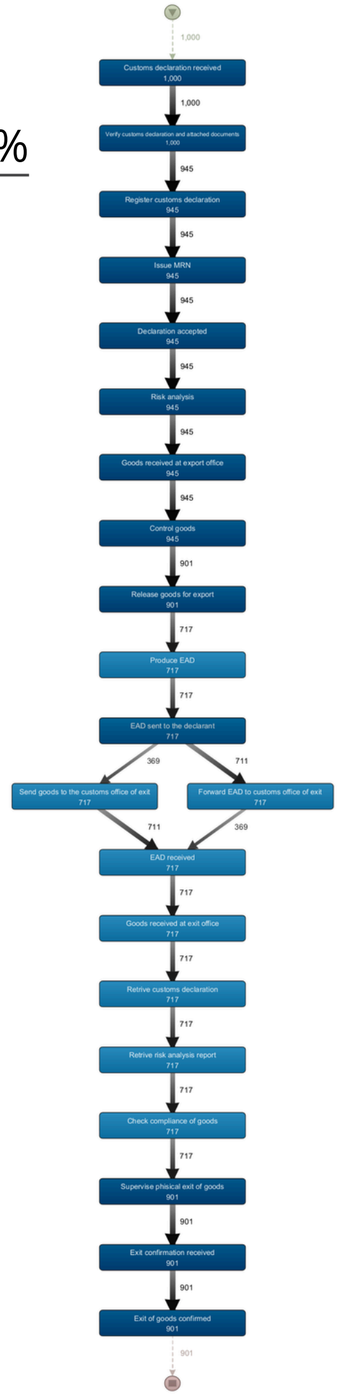
Process Discovery - Disco

Global statistics



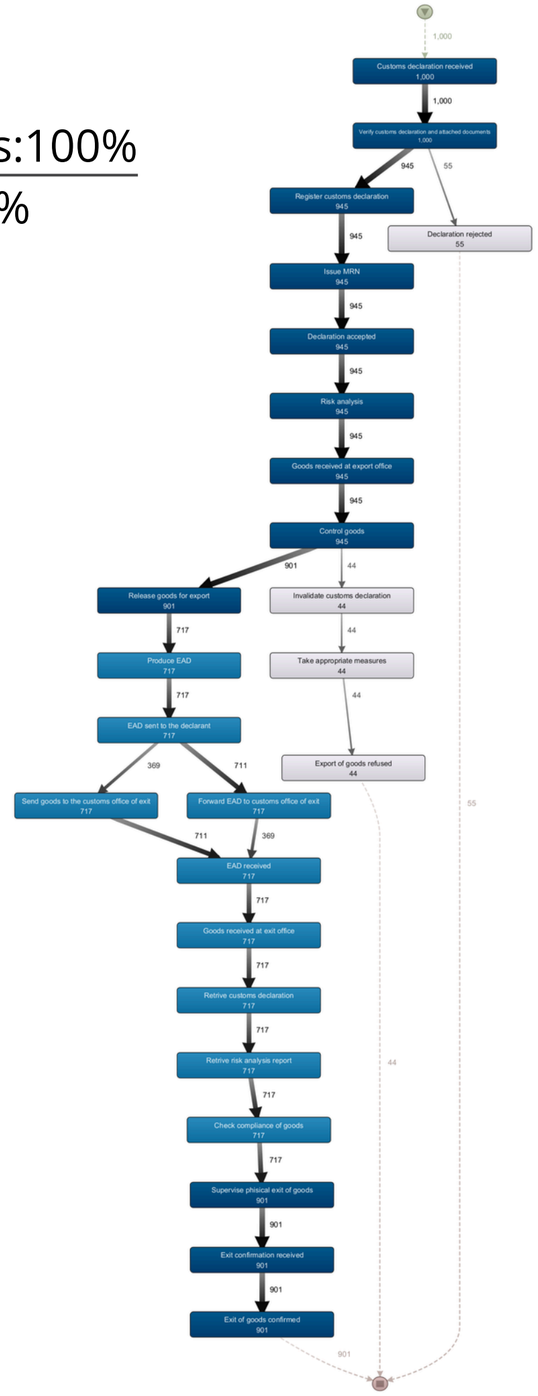
Activities: 0%

Paths: 0%



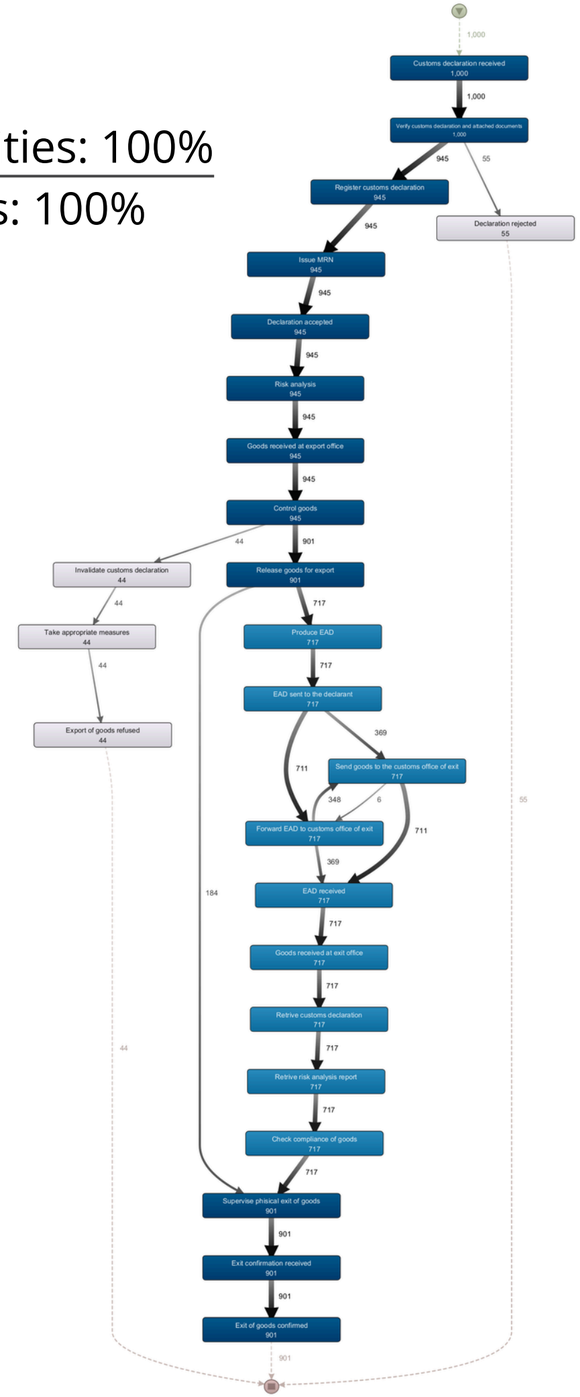
Activities:100%

Paths: 0%



Activities: 100%

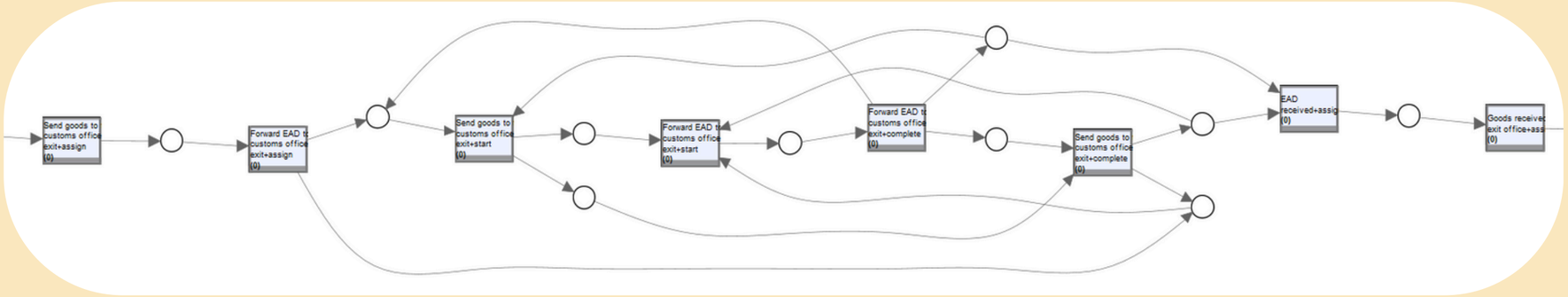
Paths: 100%

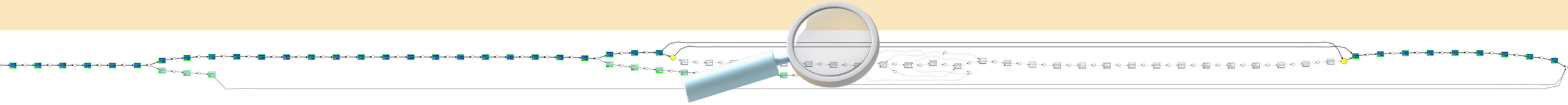


Process Discovery - ProM

Alpha algorithm, several attempts:

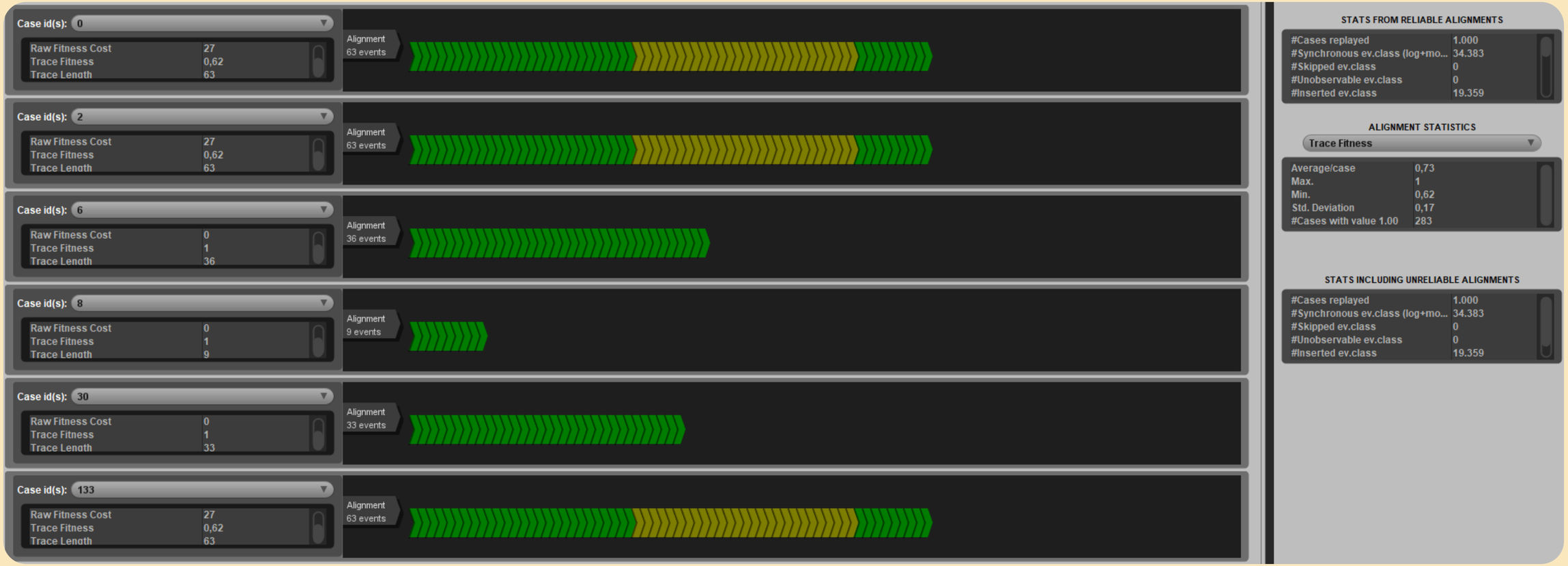
- Alpha
- Alpha+
- AlphaR





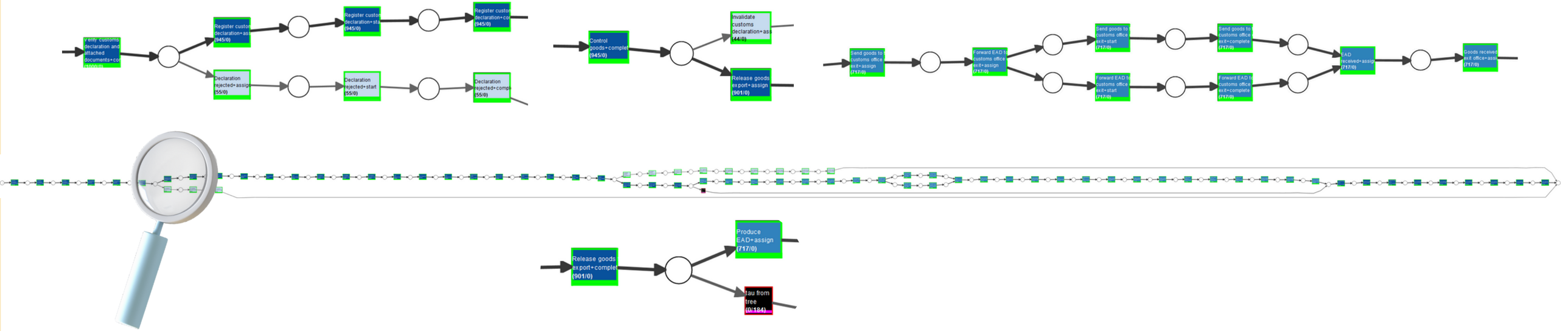
Trace Alignment

Alpha Algorithm

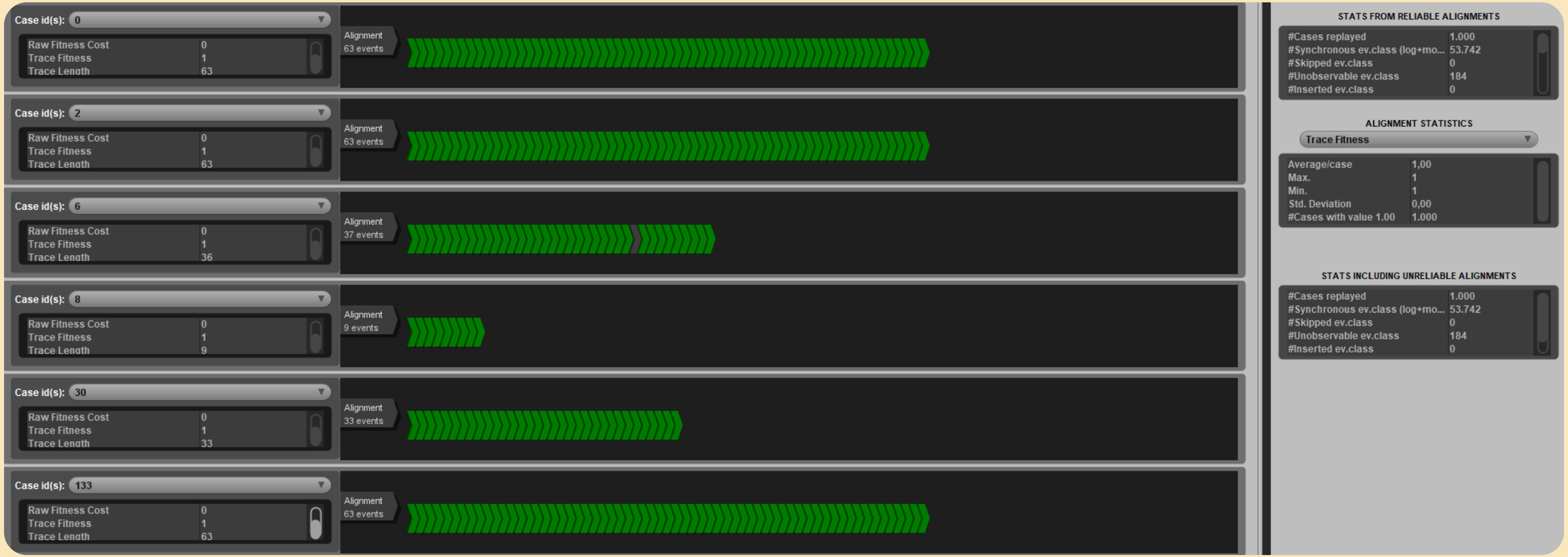


Process Discovery - ProM

Inductive Miner



Trace Alignment
Inductive Miner



Thanks for the attention!

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Glossary

ACSystem
Automatic Customs System

EORI
Economic Operator Registration and Identification

MRN
Movement Reference Number

EAD
Export Accompanying Document