



“CUSTOMS
PROCESS”

Customs Export Process

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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 the customs 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

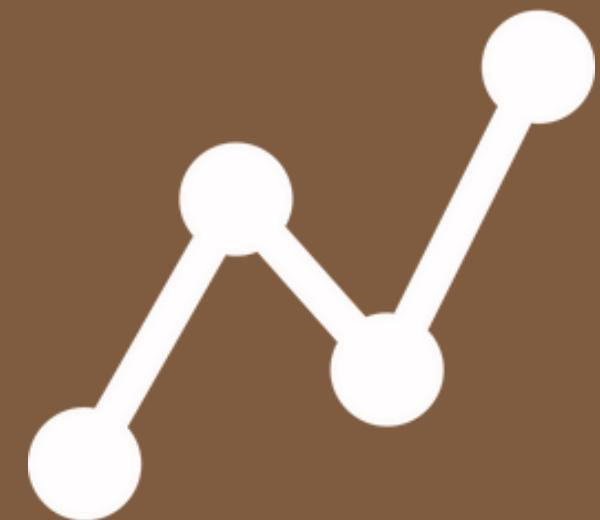


Project Phases

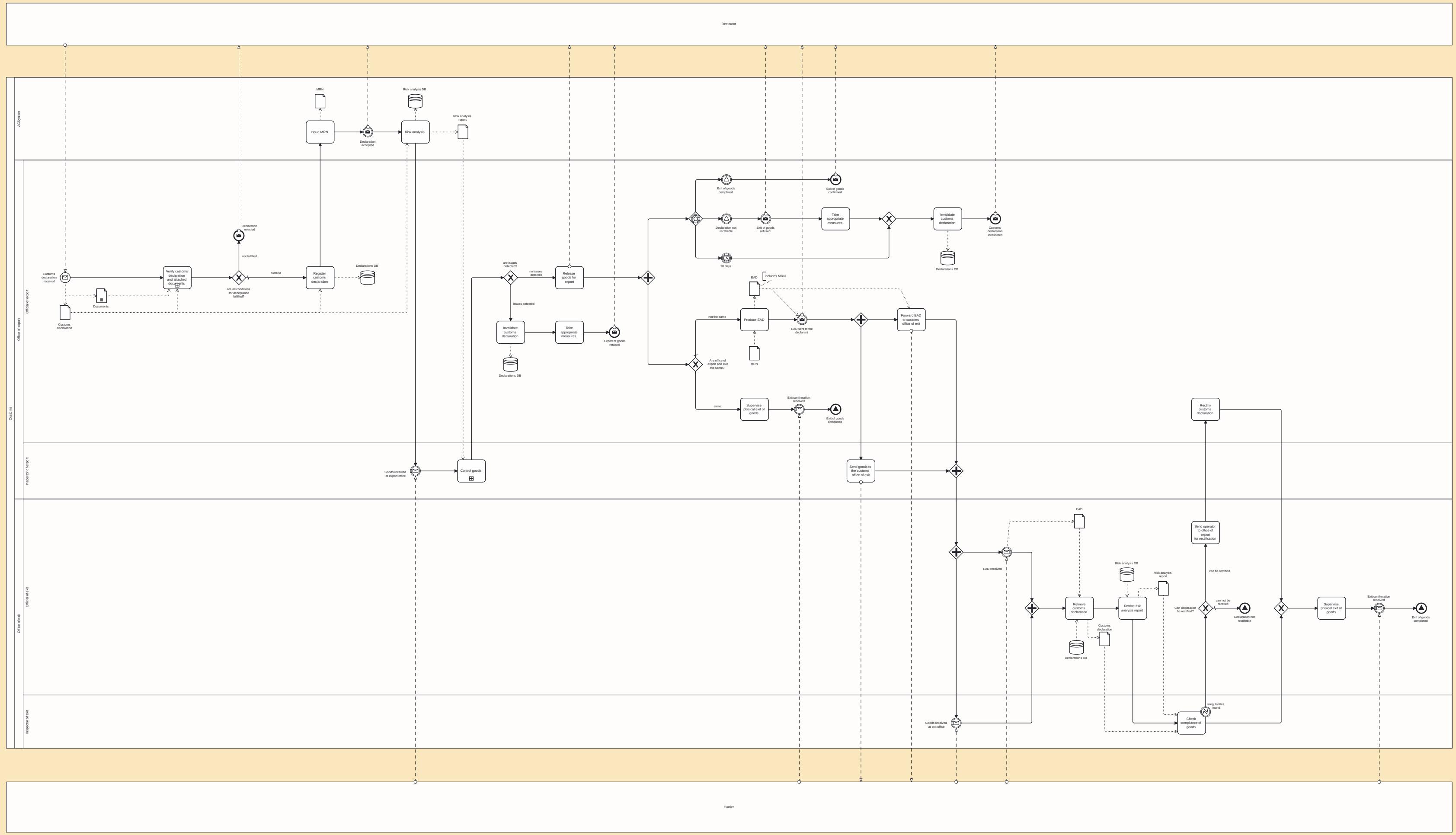
- 1 Modelling
- 2 Analysis
- 3 Execution
- 4 Robotic Process Automation
- 5 Process Mining



Process Modelling

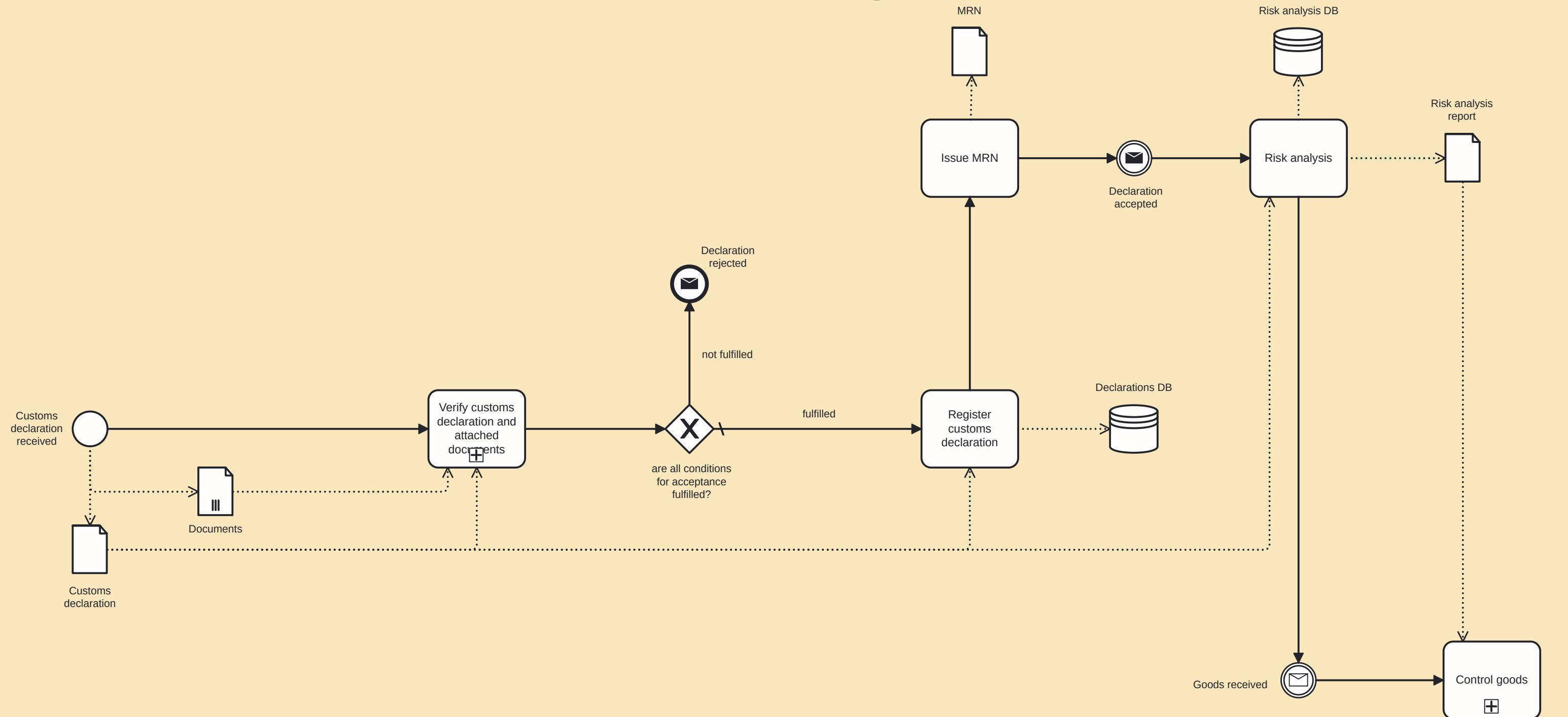


BPMN.io



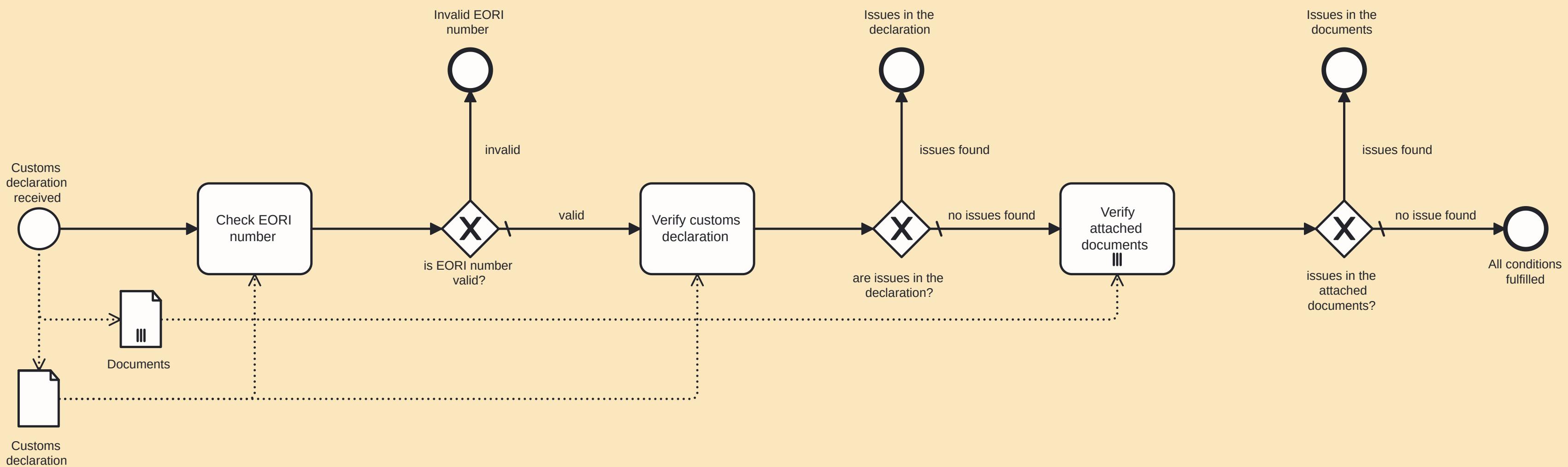
Process Model

Formalities at the office of export



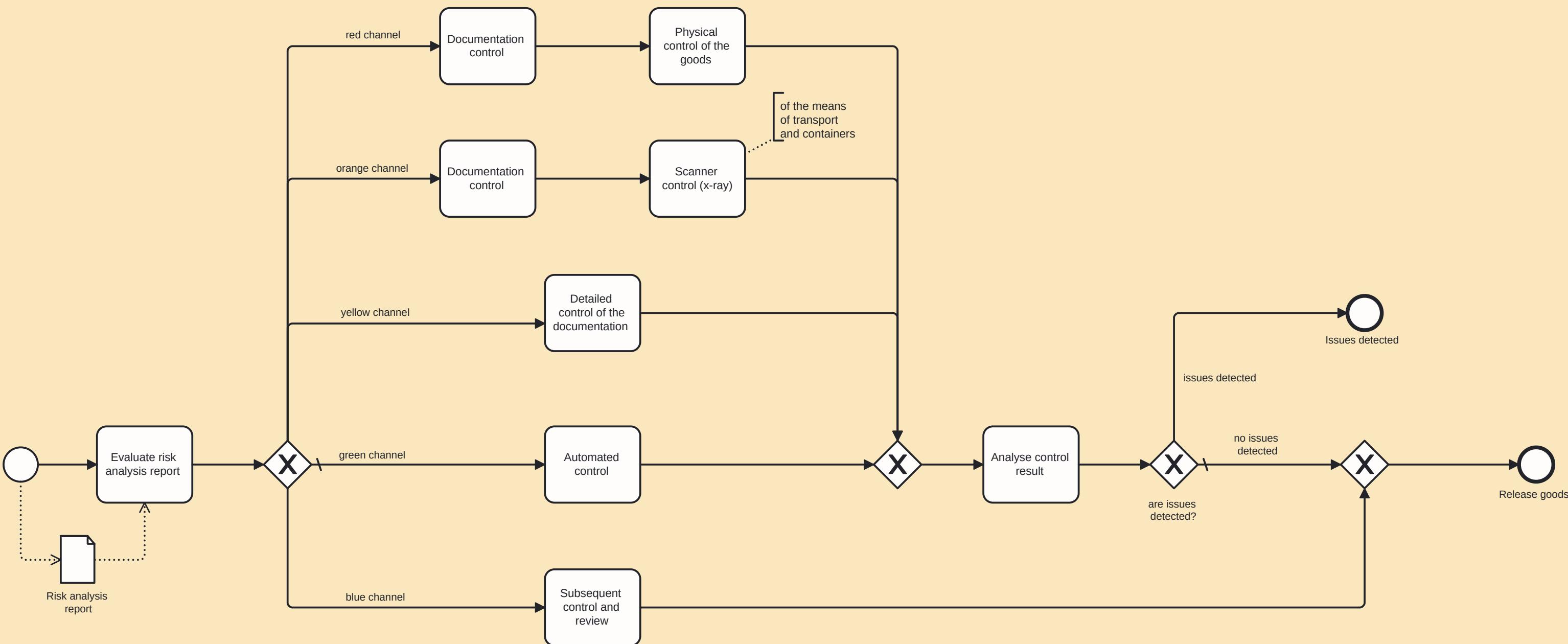
Process Model

Subprocess: Verify customs declaration and attached documents



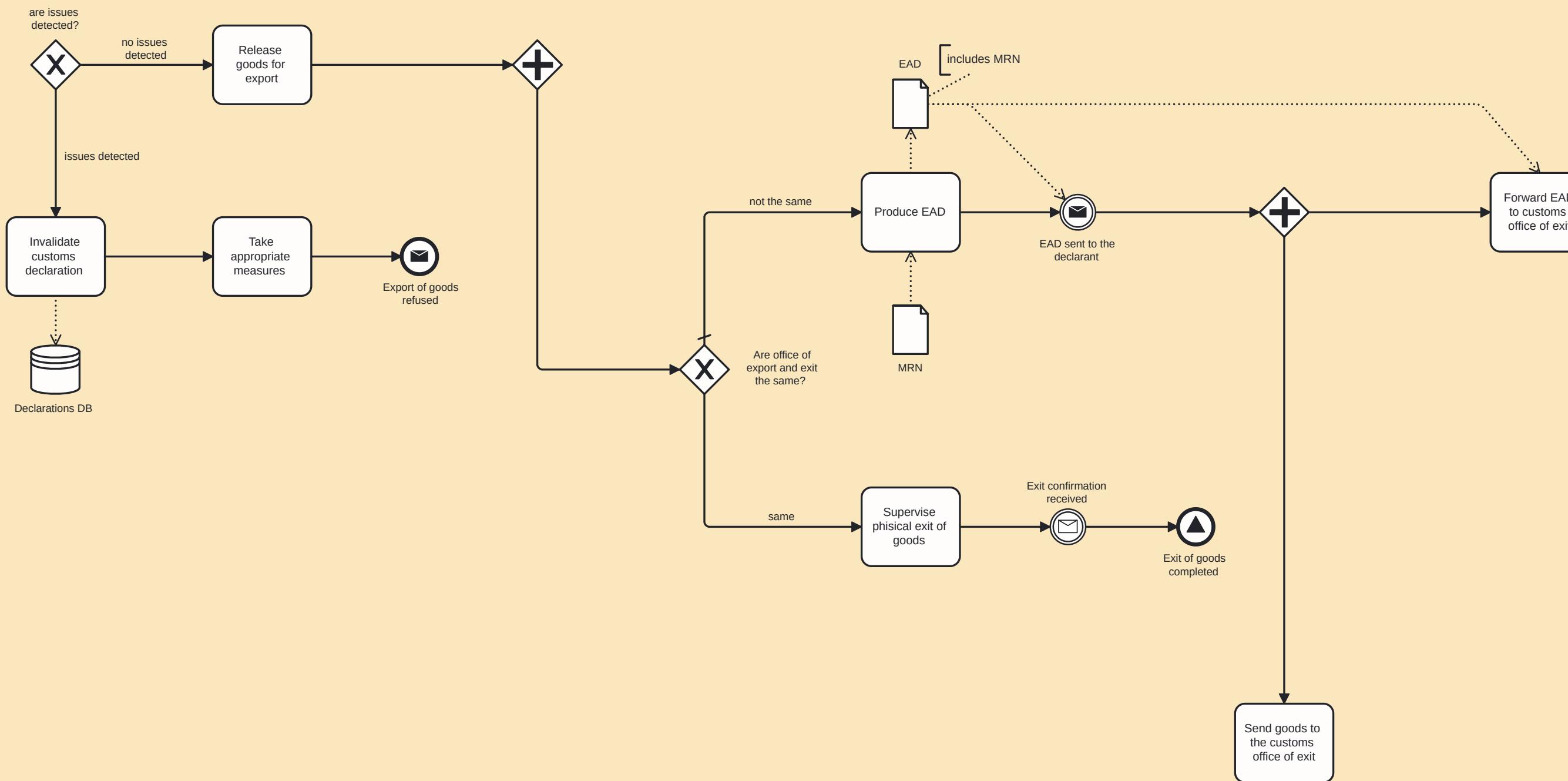
Process Model

Subprocess: Control of goods



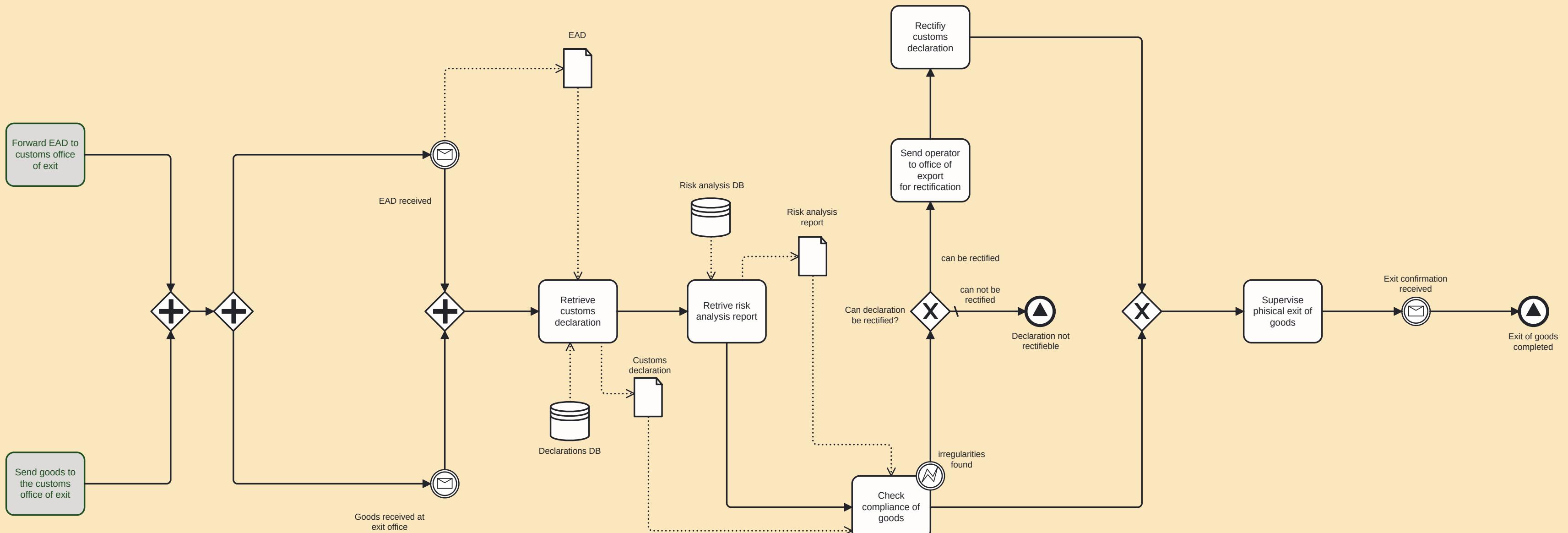
Process Model

Release for export



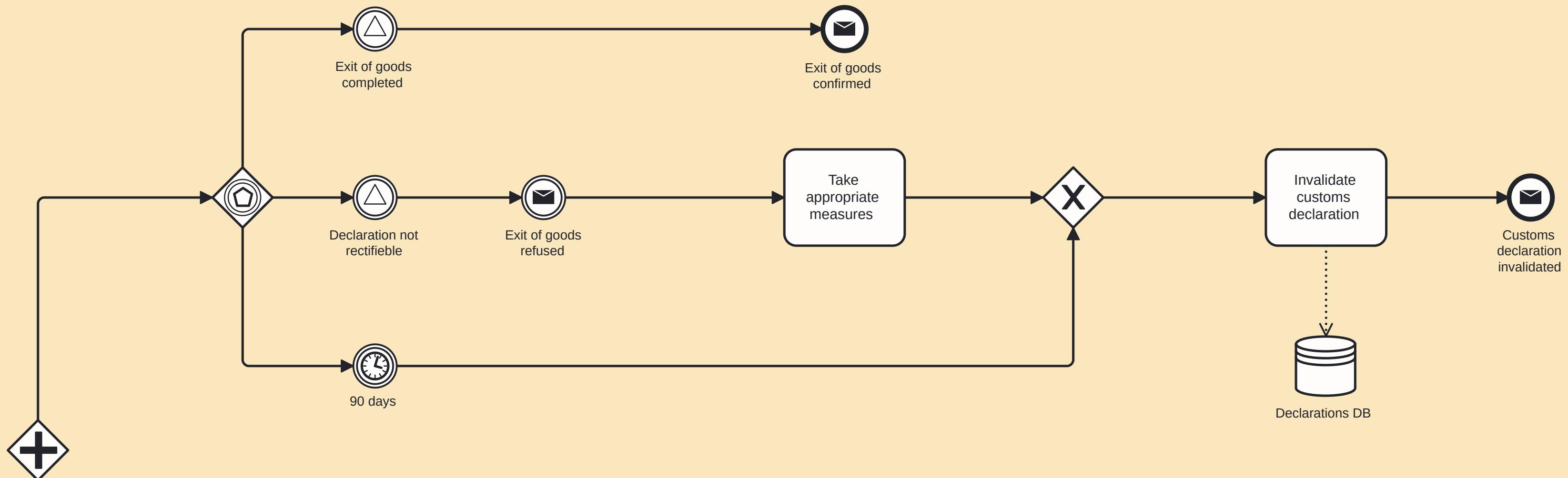
Process Model

Formalities at the office of exit

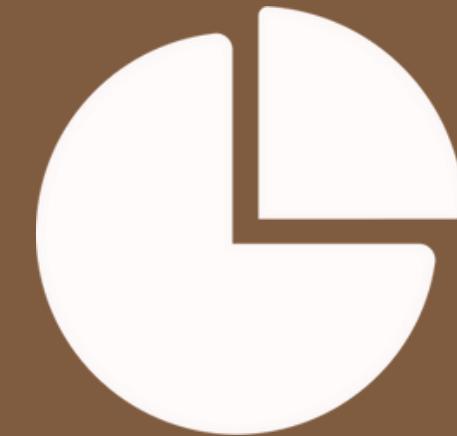


Process Model

Process termination



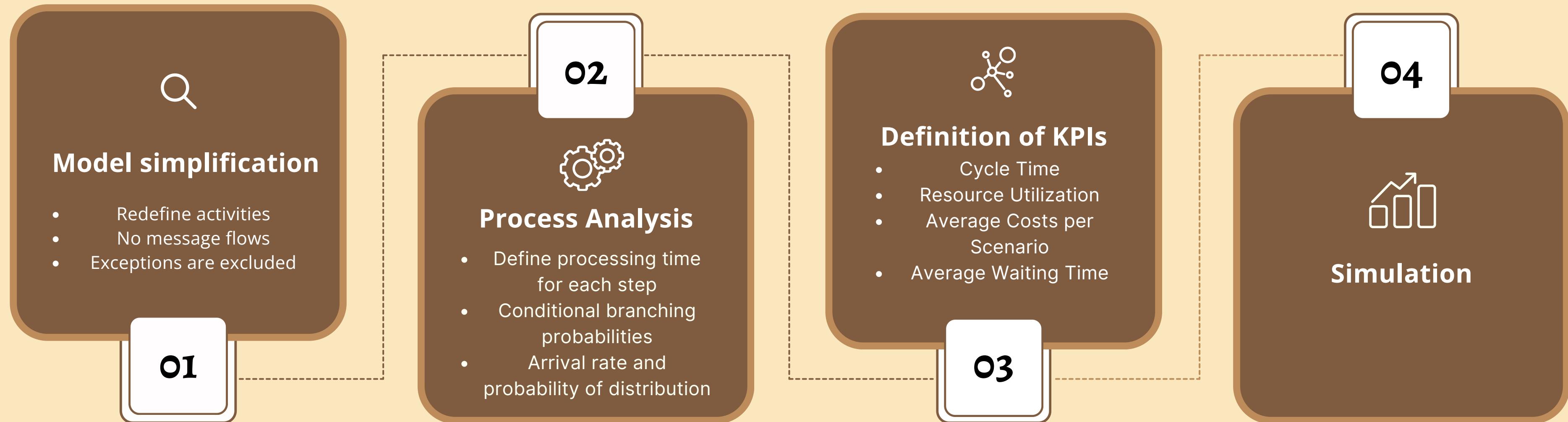
Process Analysis



SIGNAVIO

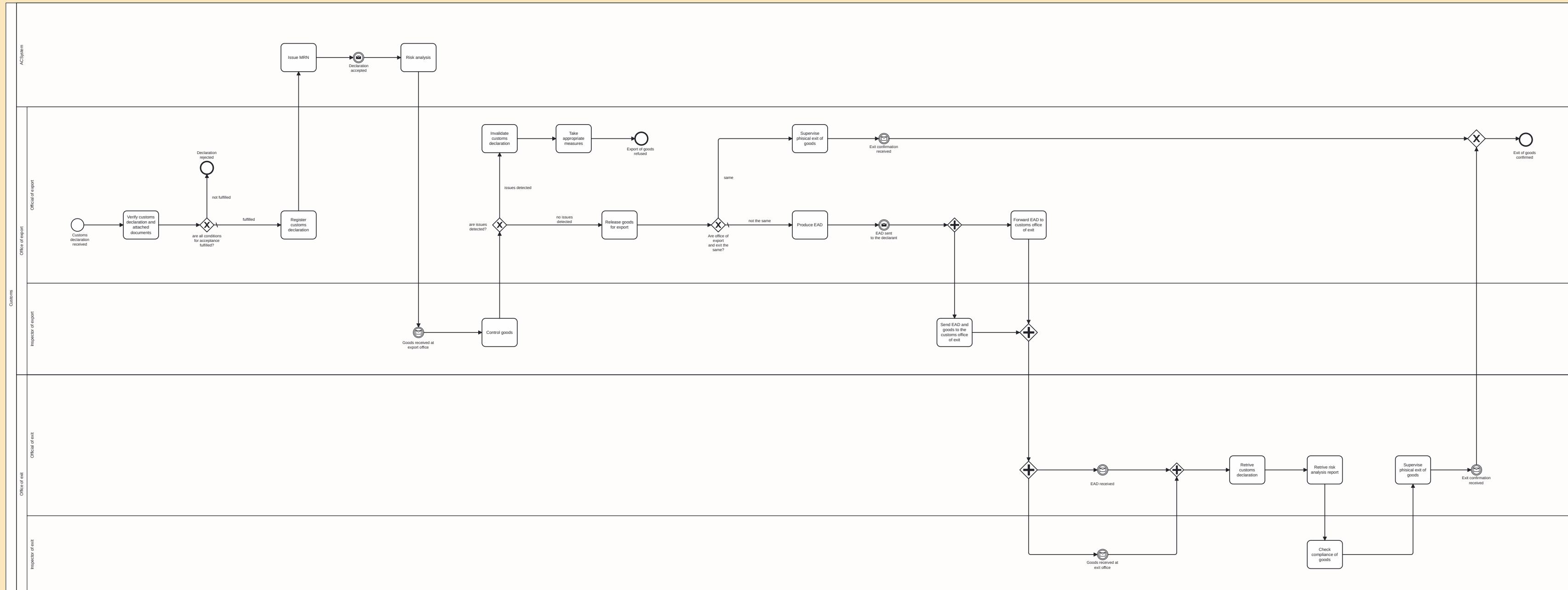
BIMP
powered by QBP Engine

Simulation Details



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 physical 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
Retrieve customs declaration	Fixed	1 min	-	Official of Exit
Retrieve risk analysis report	Fixed	1 min	-	Official of Exit
Check compliance of goods	Exponential	20 min	-	Inspector of Exit
Supervise physical exit of goods (exit)	Normal	10 min	5 min	Official of Export

Process Analysis - Basis

Branching Probabilities

Inter Arrival Time



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

Distribution Function

Exponential

Mean

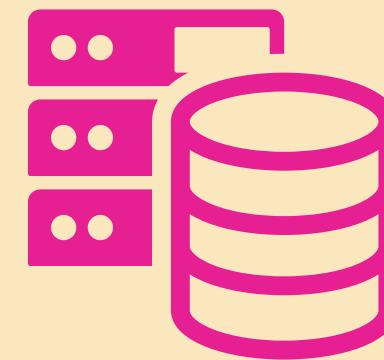
55 min

Number of Instances

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



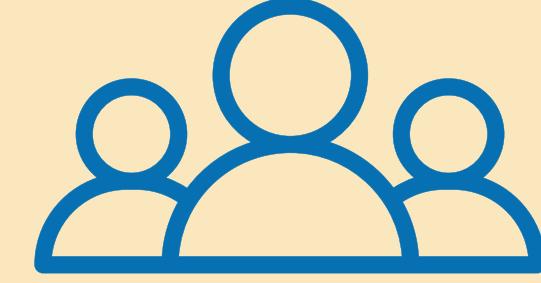
⌚ Mon-Fri: 09:00 – 15:00

 4 people

 20 €/hour

Office of Exit

Exit Official



⌚ Mon-Fri: 09:00 – 17:00

 5 people

 30 €/hour

Exit Inspector



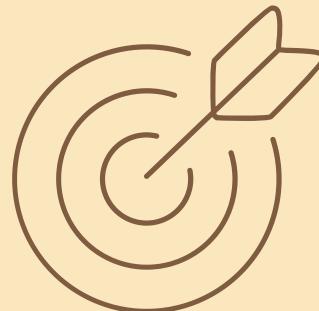
⌚ Mon-Fri: 09:00 – 15:00

 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

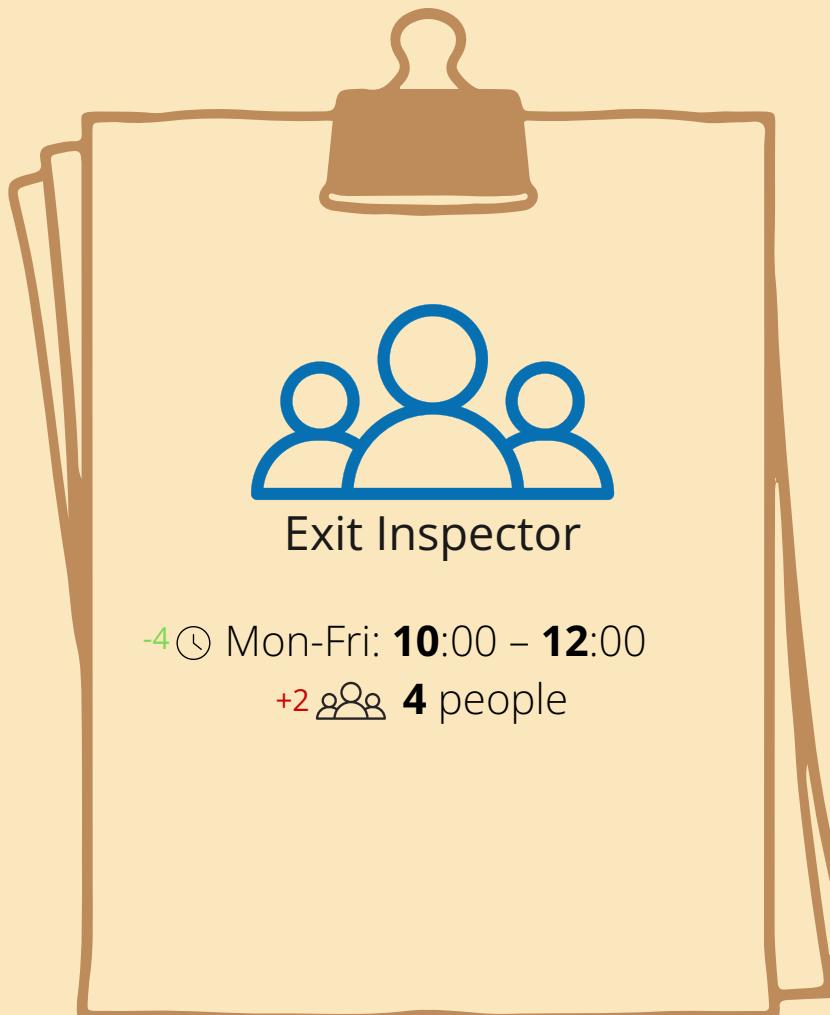


Resource Utilization

The amount of resources involved in the entire Cycle Time

Scenarios

Scenario A



Bottleneck fixed on
Check compliance of goods

Scenario B



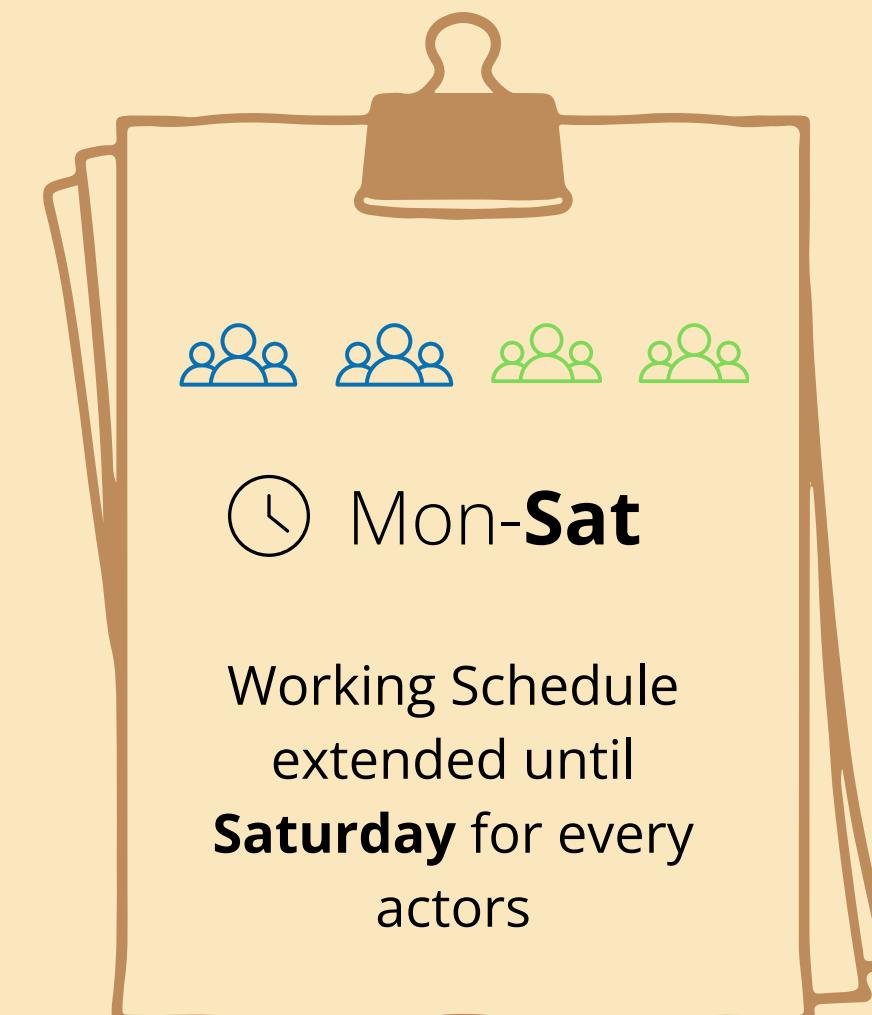
Resource Utilization
increased for Exit Official

Scenario C



Cost of a Process Instance decreases

Scenario D



UPDATE

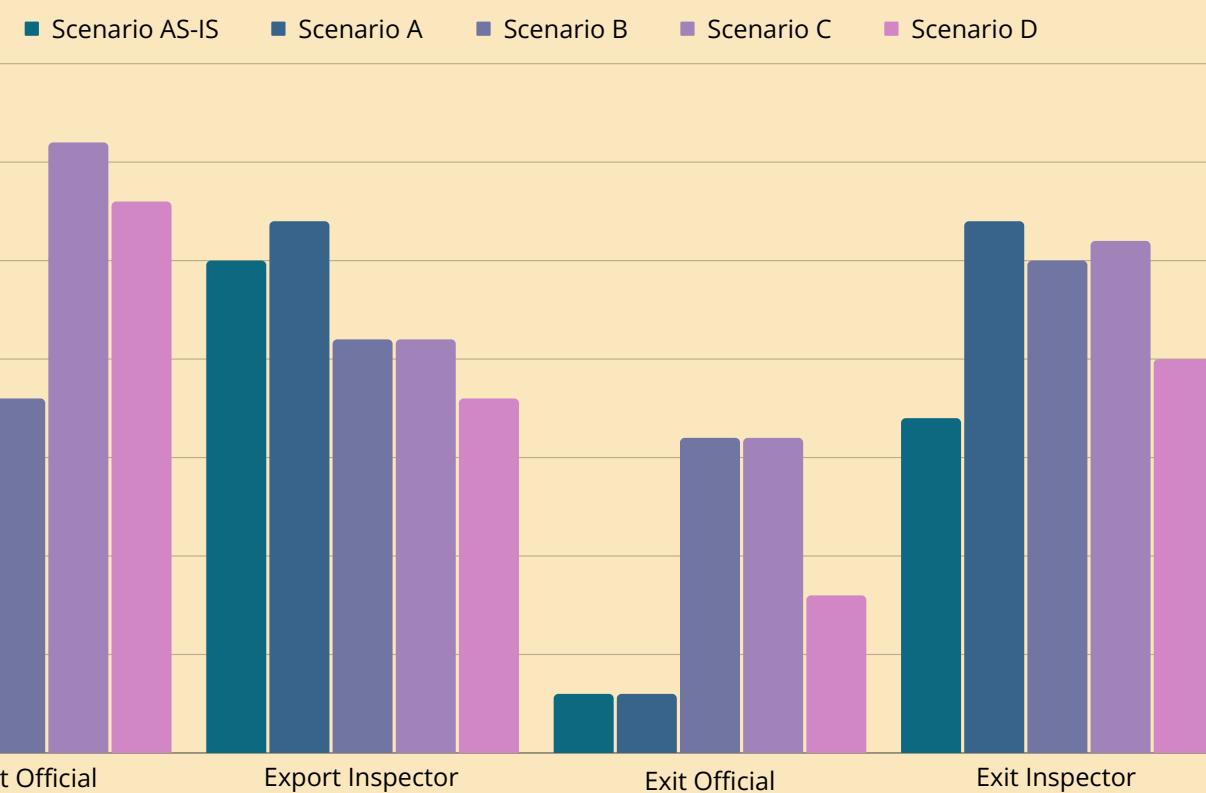
Results

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 Inspector	18 % 25 %	18 % 27 %	18 % 21 %	31 % ↑ 21 %
 Resource Utilization Exit	Official Inspector	3,0 % 17 %	3,0 % 27 % ↑	16 % ↑ 25 %	16 % 26 %
					8,2 % 20%

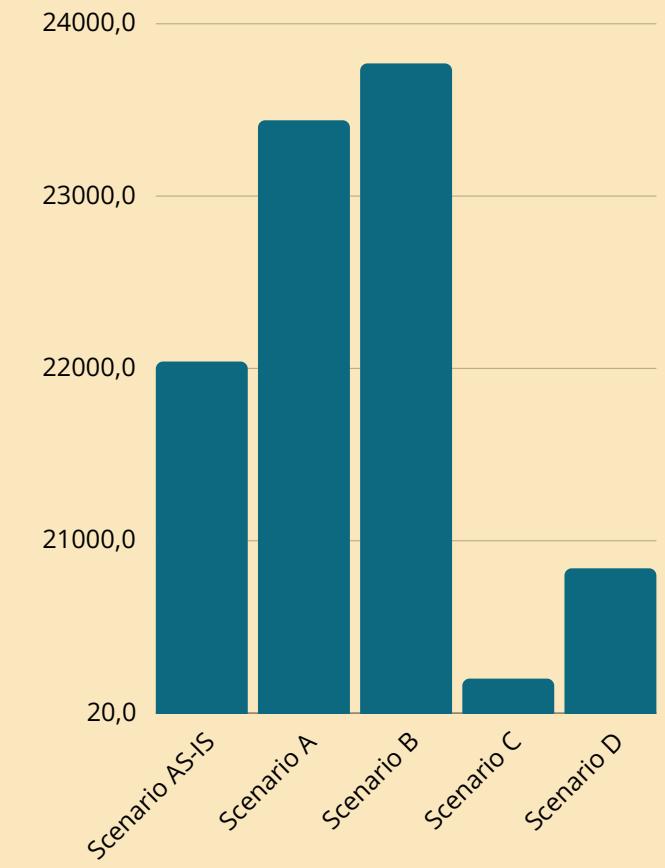
Charts



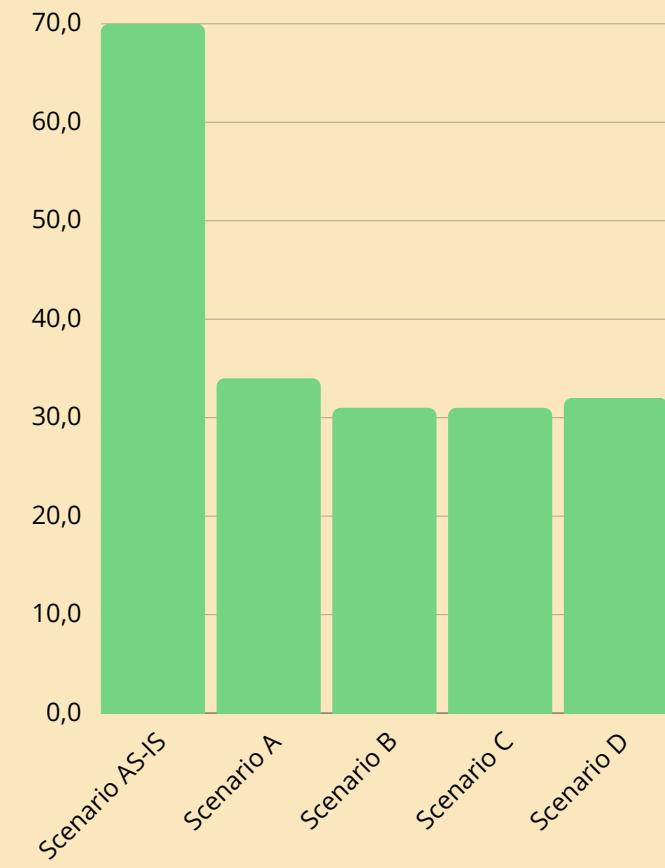
Resource Utilization



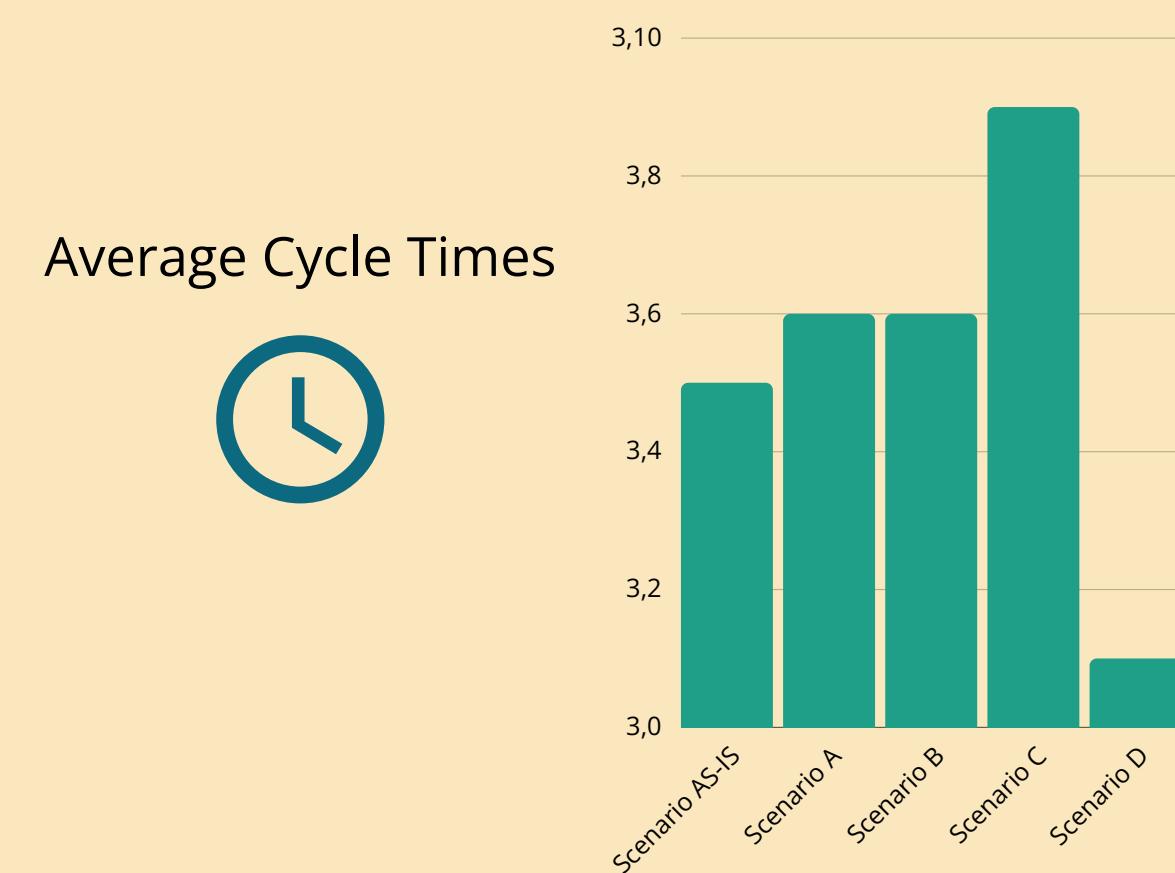
Average Costs



Average Waiting Times



Average Cycle Times



Process Execution



01

Process Model

02

Data Model

03

Form

04

Business Rules

05

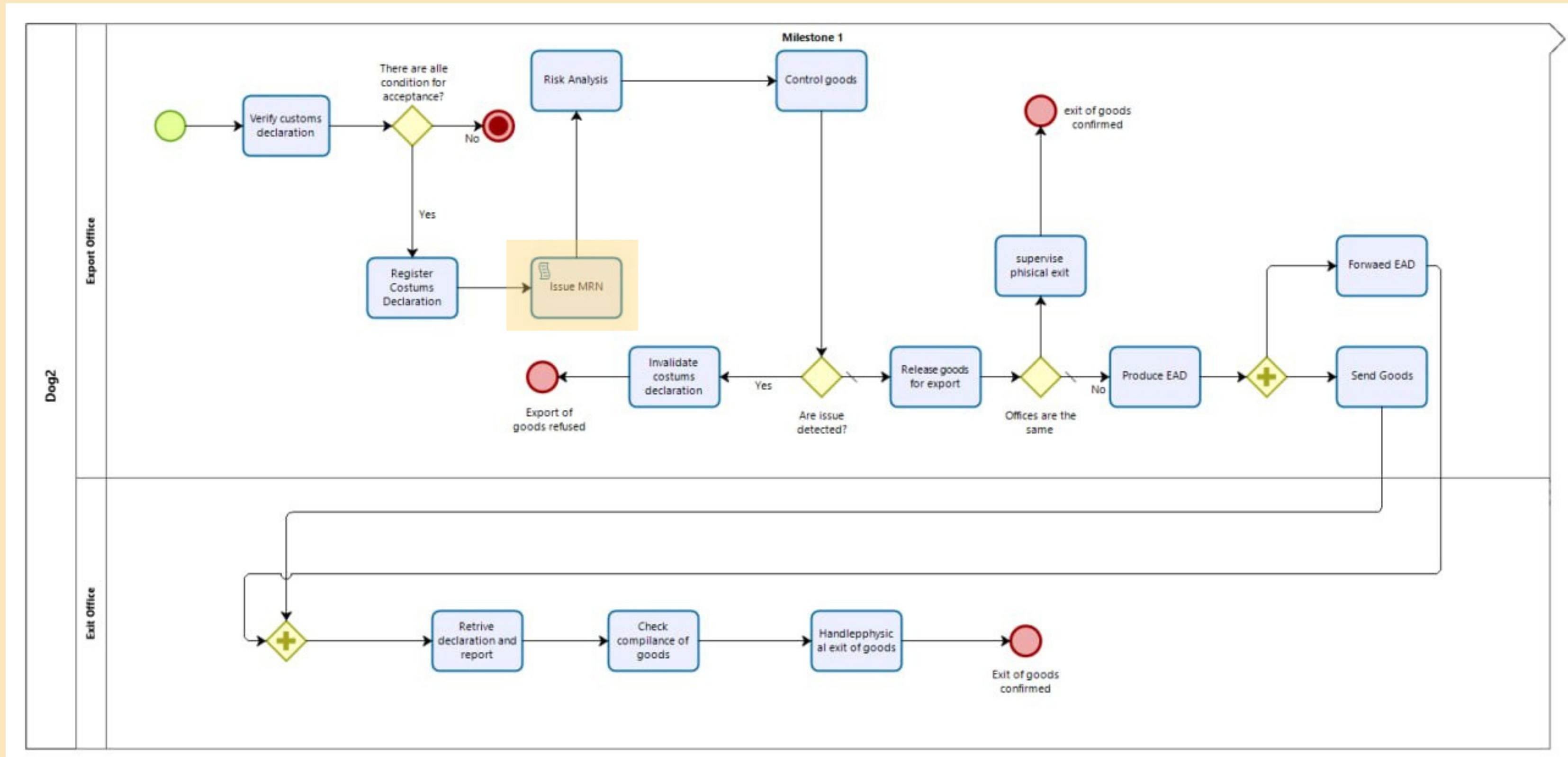
Performers

06

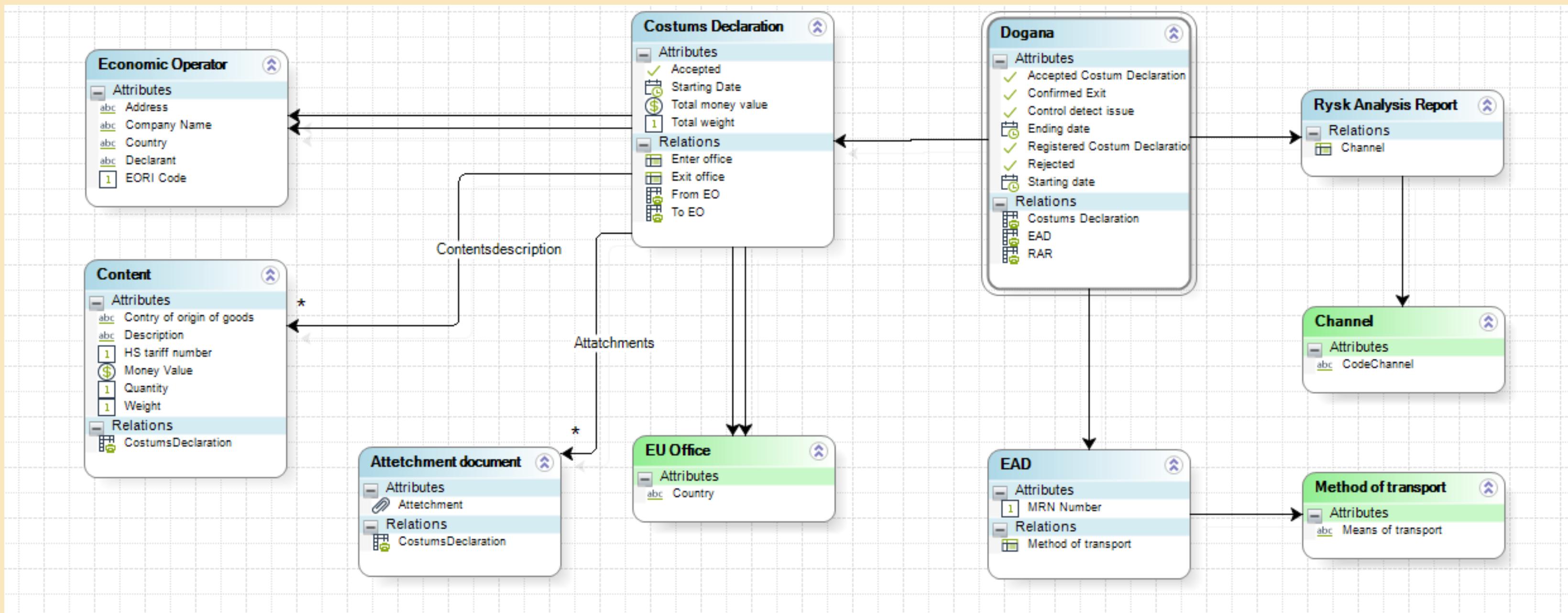
Execution

Execution Components

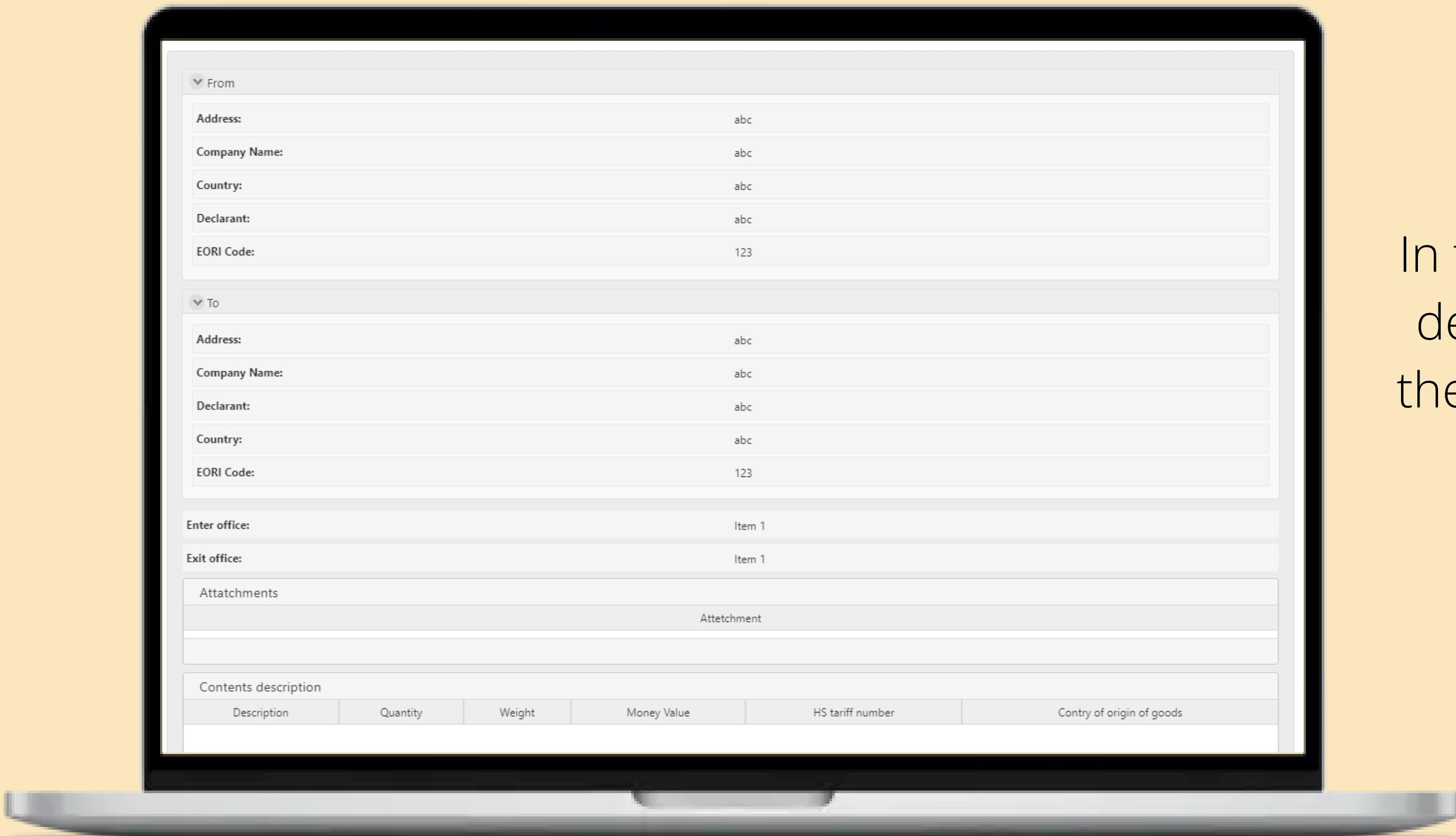
Process Model



Data Model

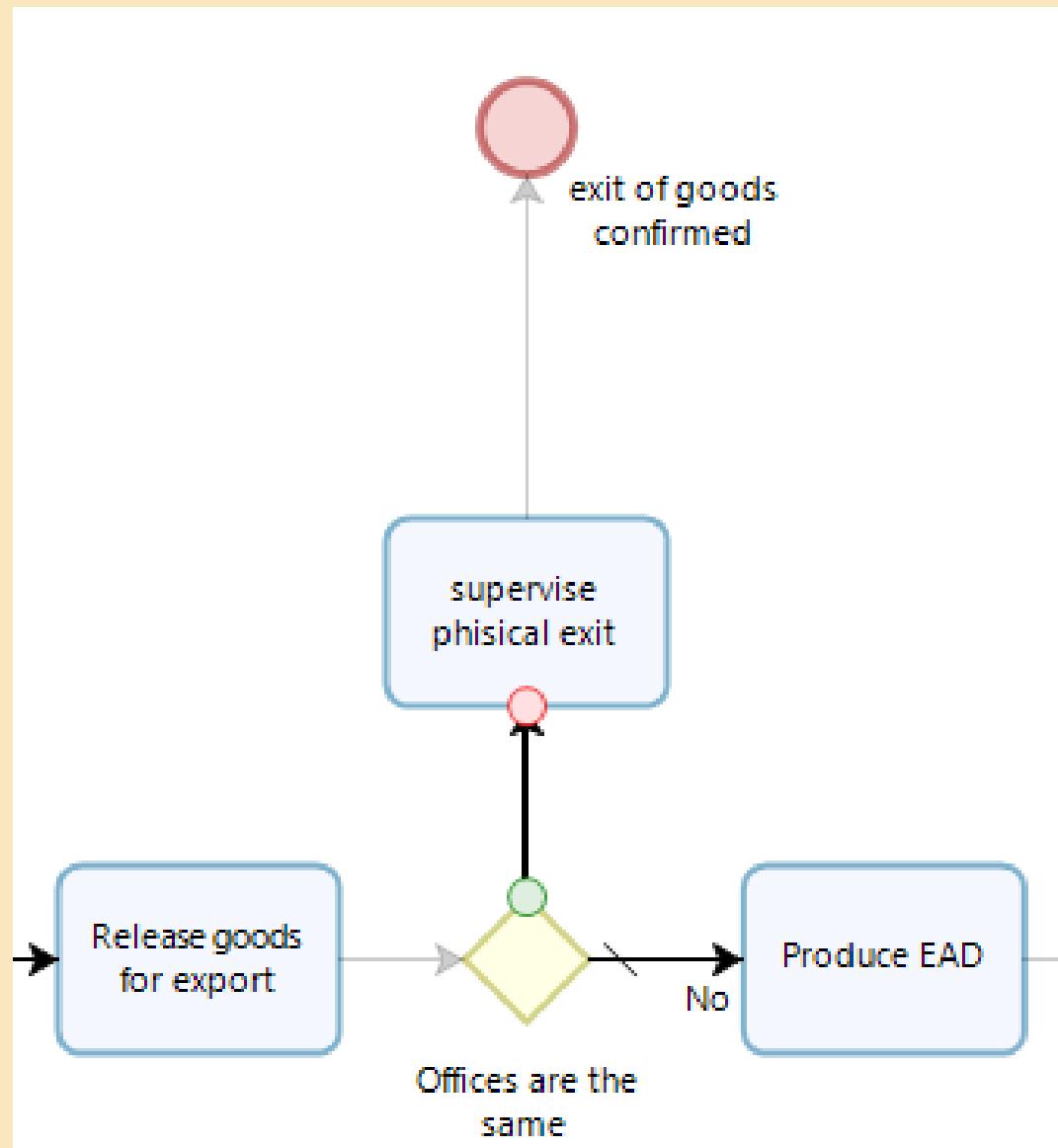


Forms



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

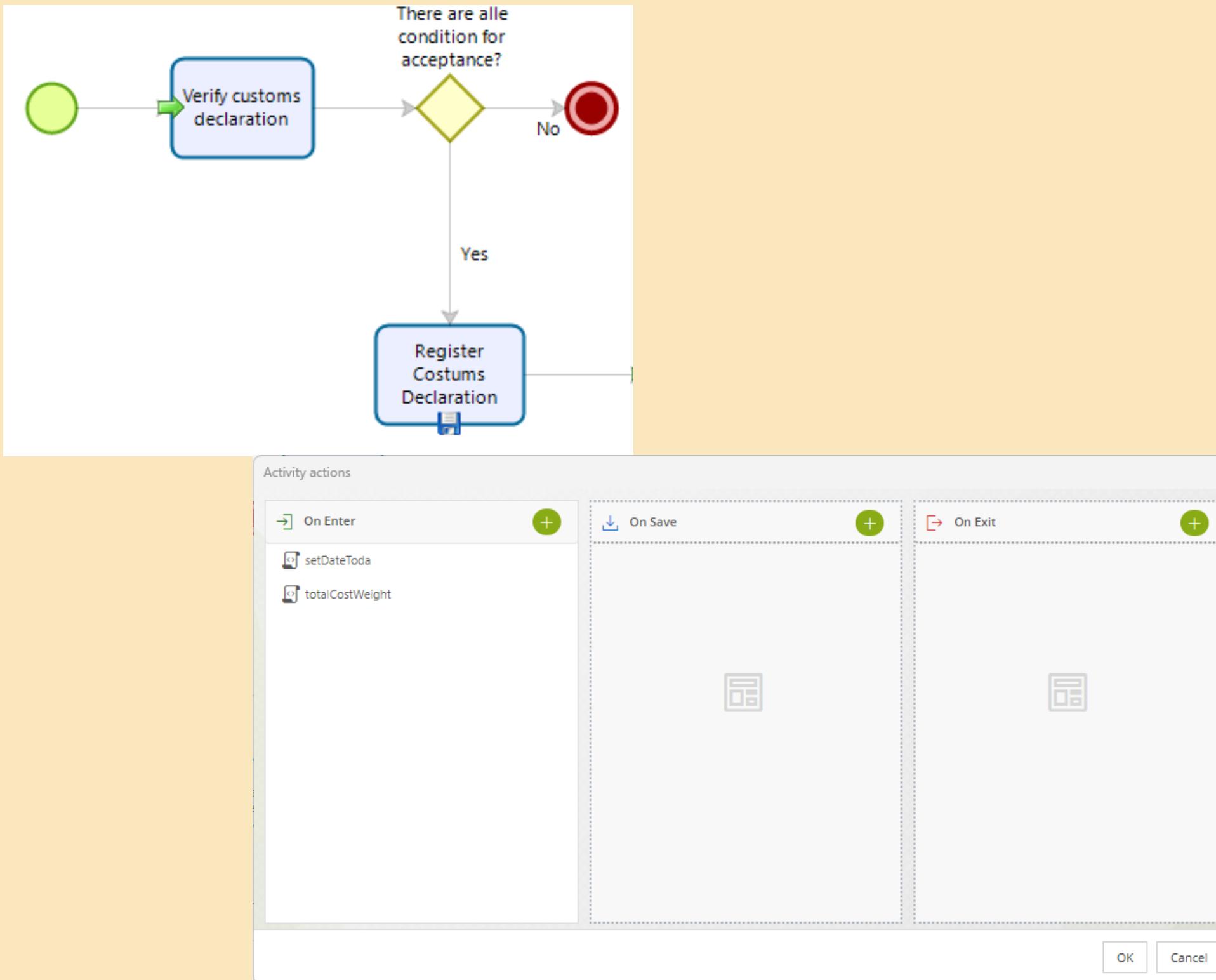
Business Rules



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

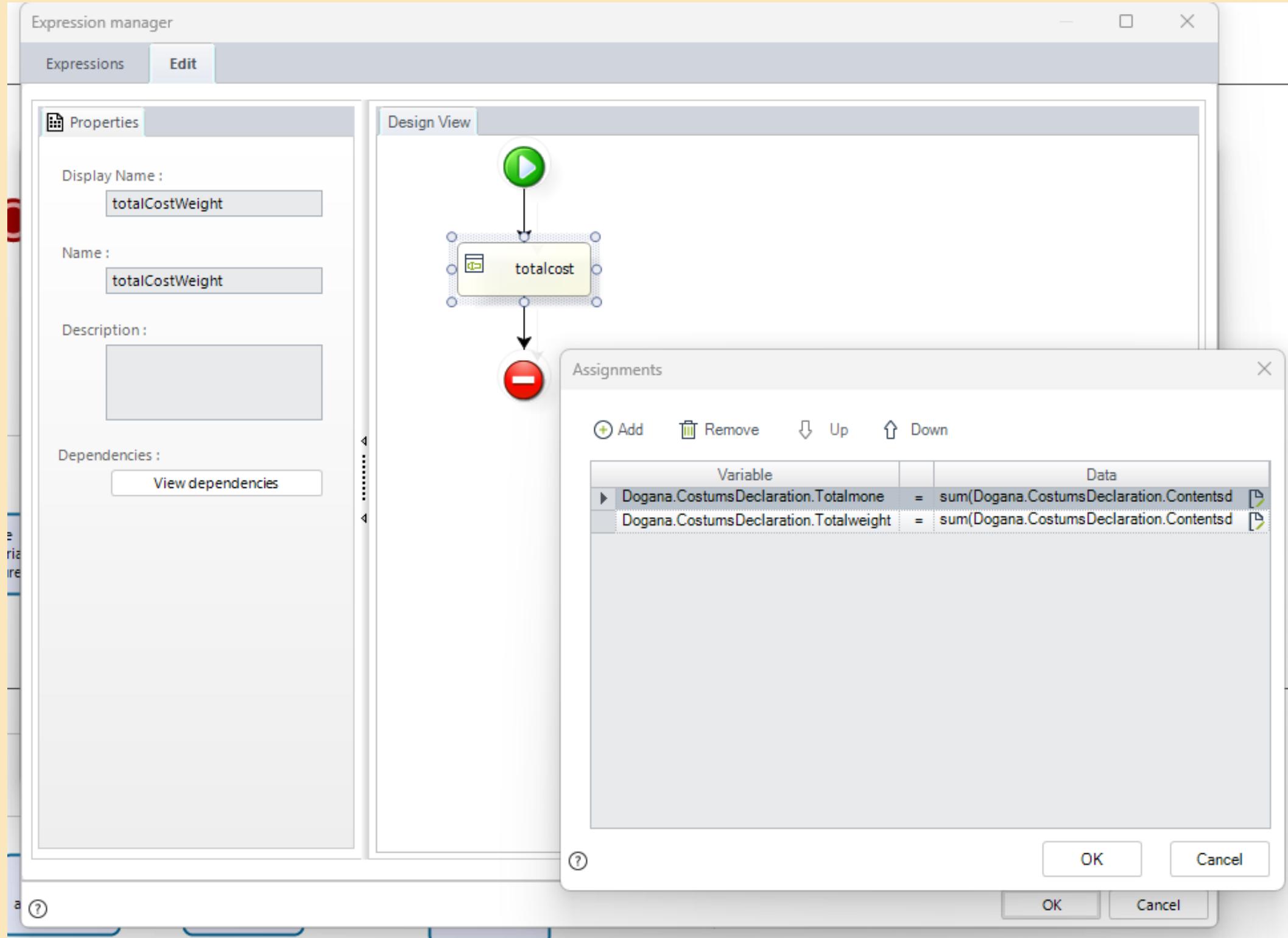
`Dogana.CostumsDeclaration.Enteroffice` is equal to `Dogana.CostumsDeclaration.Exitoffice`

Business Rules



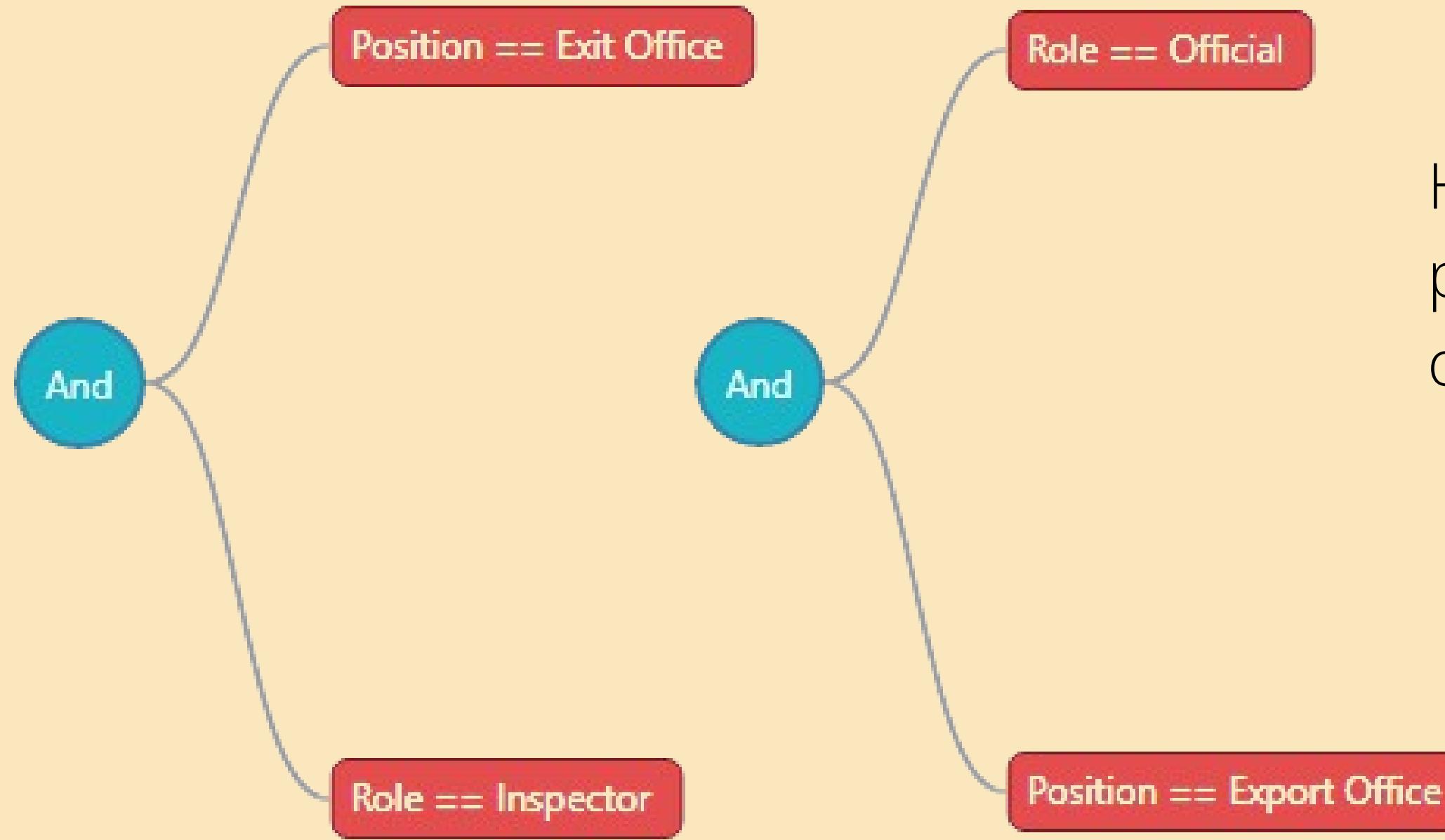
Activity Actions, perform data calculations (set Date, calculate total value, etc.)

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

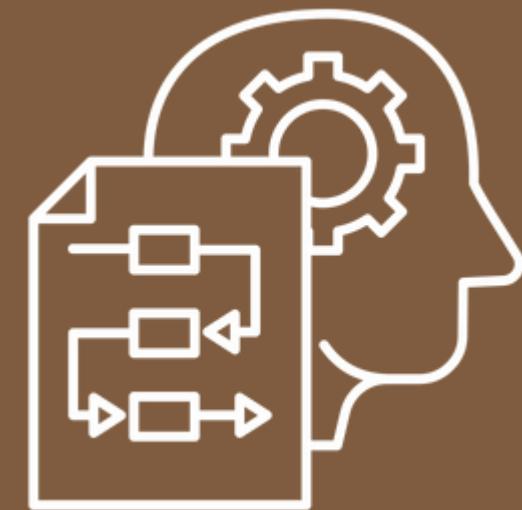
The image shows a screenshot of the bizagi software interface. At the top, there is a dark green header bar with the 'bizagi' logo on the left and several menu items: 'Inbox', 'Nuova istanza', 'Ricerche', 'Rapporti', 'Processi attivi', 'Impostazioni', and a search bar 'Cerca'. On the far right of the header is a user profile icon with the letter 'A'.

The main area features a light gray background with a white 'Nuova istanza' (New instance) dialog box centered. This dialog box contains two sections of form fields:

Section	Field	Value
From	Address:	Via Dei Matti 0
	Company Name:	NoName
	Country:	Italy
	Declarant:	Mario Rossi
	EORI Code:	1234
To		
To	Address:	Via Senza Nome
	Company Name:	NoSurname
	Declarant:	Luigi Rossi
	Country:	(empty)
	EORI Code:	(empty)
Enter office:		
Office	Selezionare...	

At the bottom of the dialog box, there are buttons for saving or canceling the instance. The footer of the application includes a toolbar with icons for file operations and a status bar showing system information (0 notifications, 0 errors, 0 warnings, 0 stars).

Robotic Process Automation



UiPathTM

RPA - From a google form...

Sezione 1 di 14

Customs declaration

Dopo la sezione 1 Continua alla sezione successiva ▾

Sezione 2 di 14

Exporter informations

Company name

Address

Postal code

Sezione 5 di 14

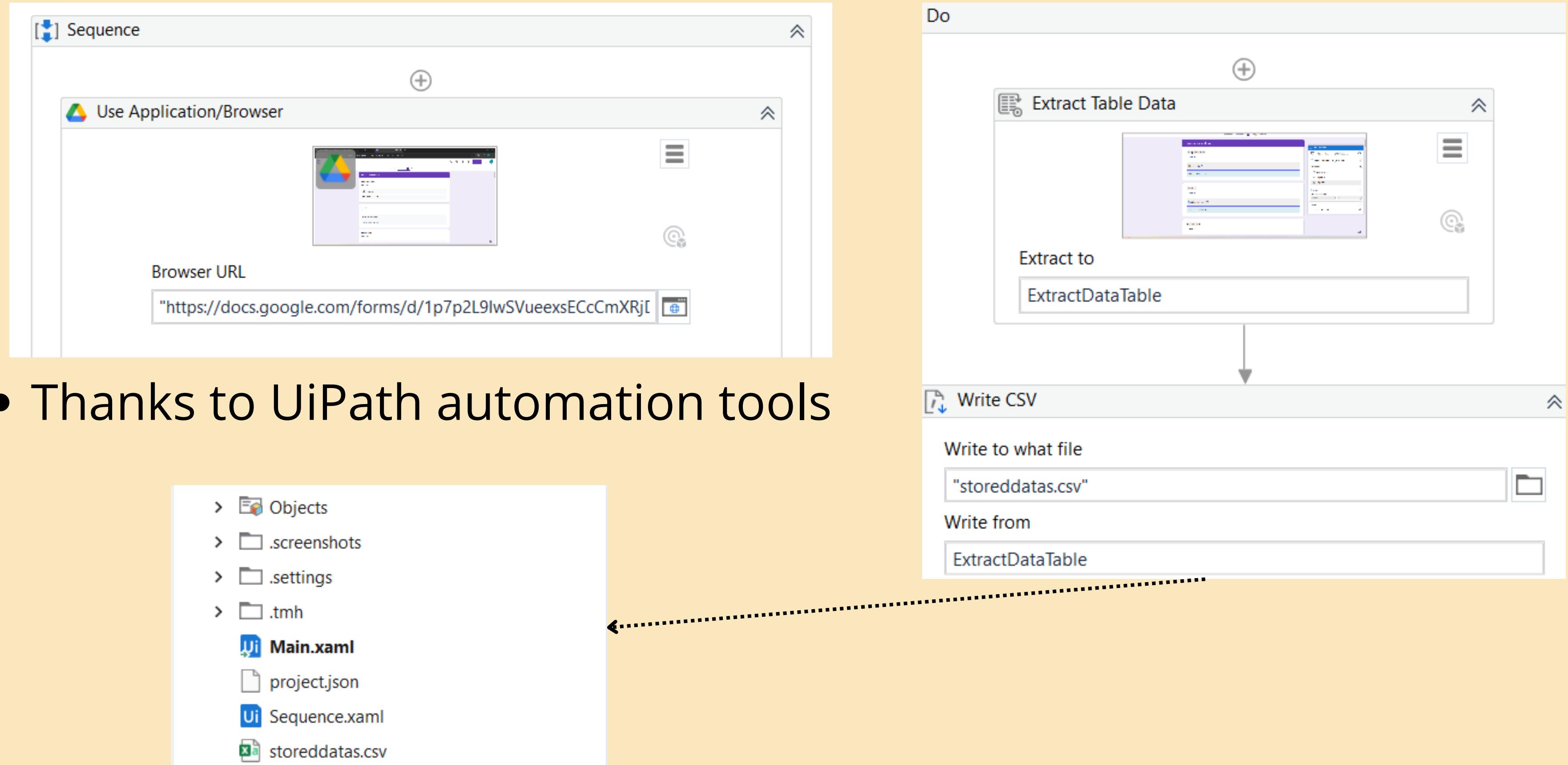
Description of the goods
Descrizione (facoltativa)

Brief description (Ex: mobile phones)
Testo risposta breve

Quantity
Testo risposta breve

HS code
Testo risposta breve

...To datas stored in tables



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			

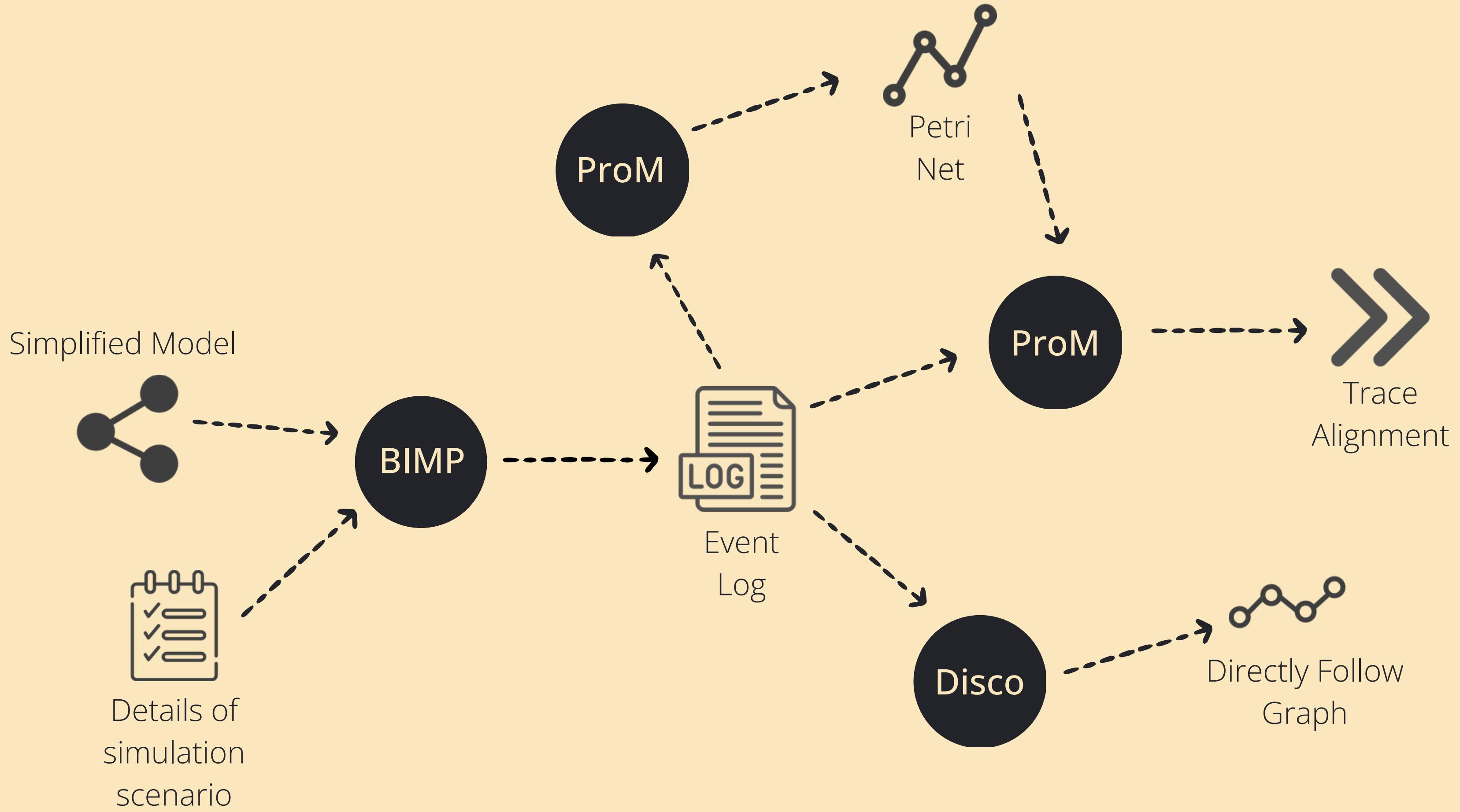
Process Mining



Disco
by Fluxicon

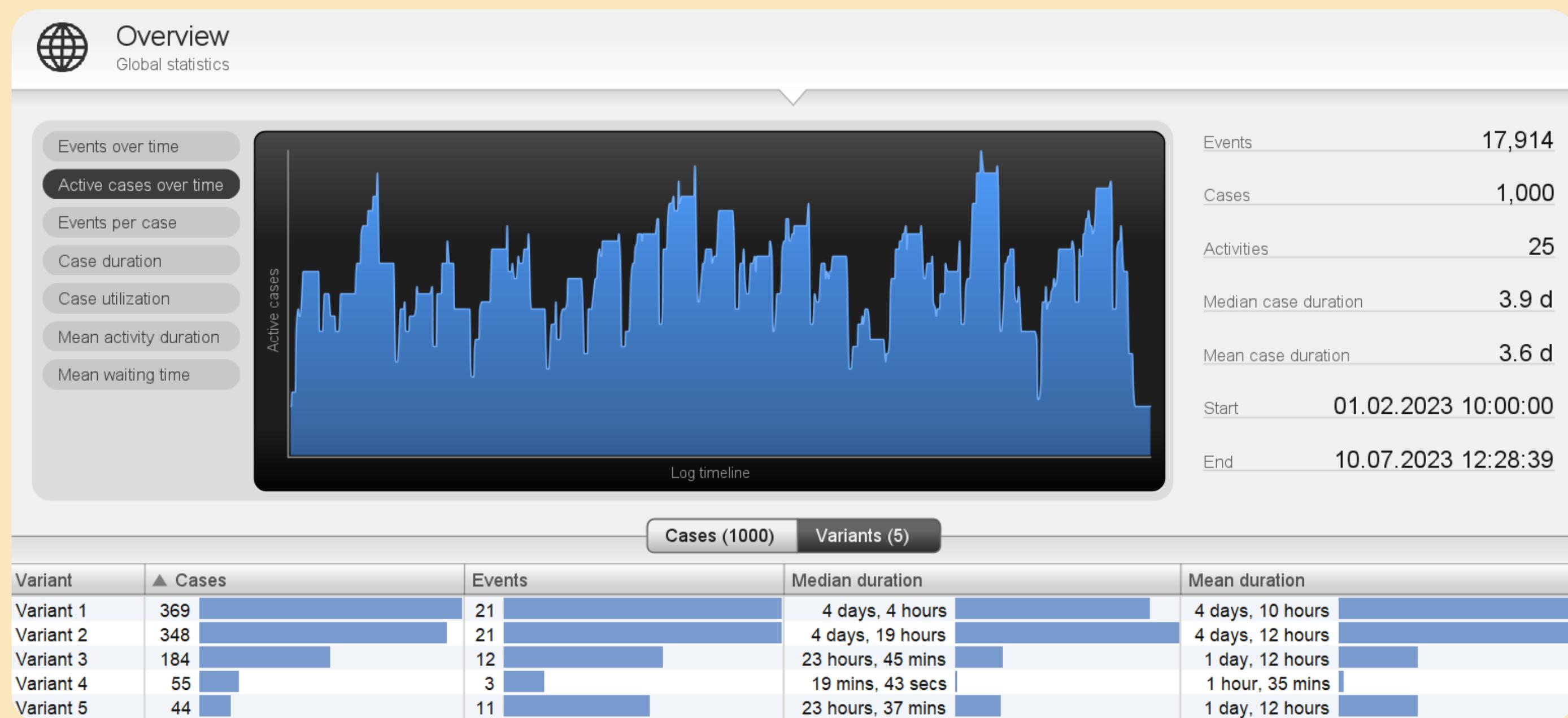
BIMP
powered by QBP Engine

PrM
process mining workbench

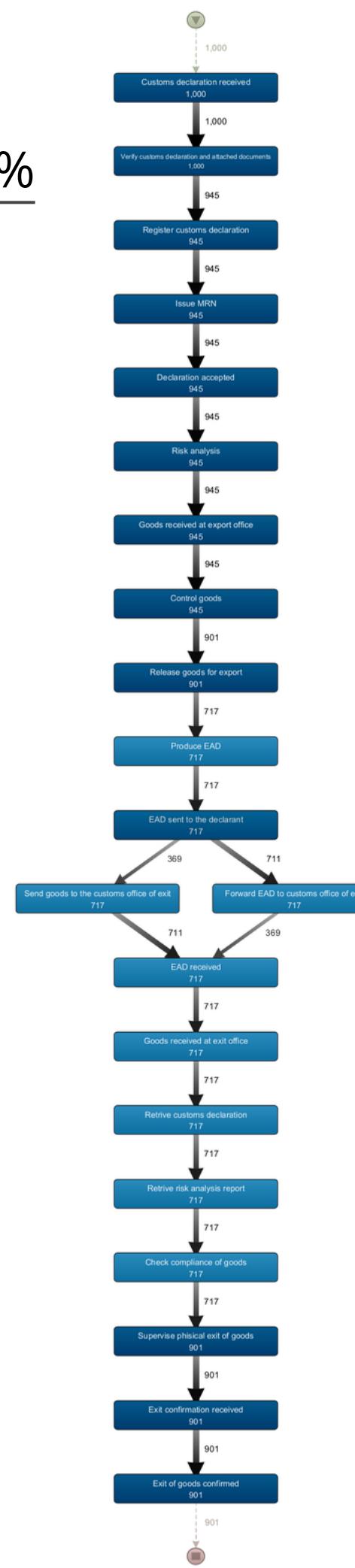


Process Discovery - Disco

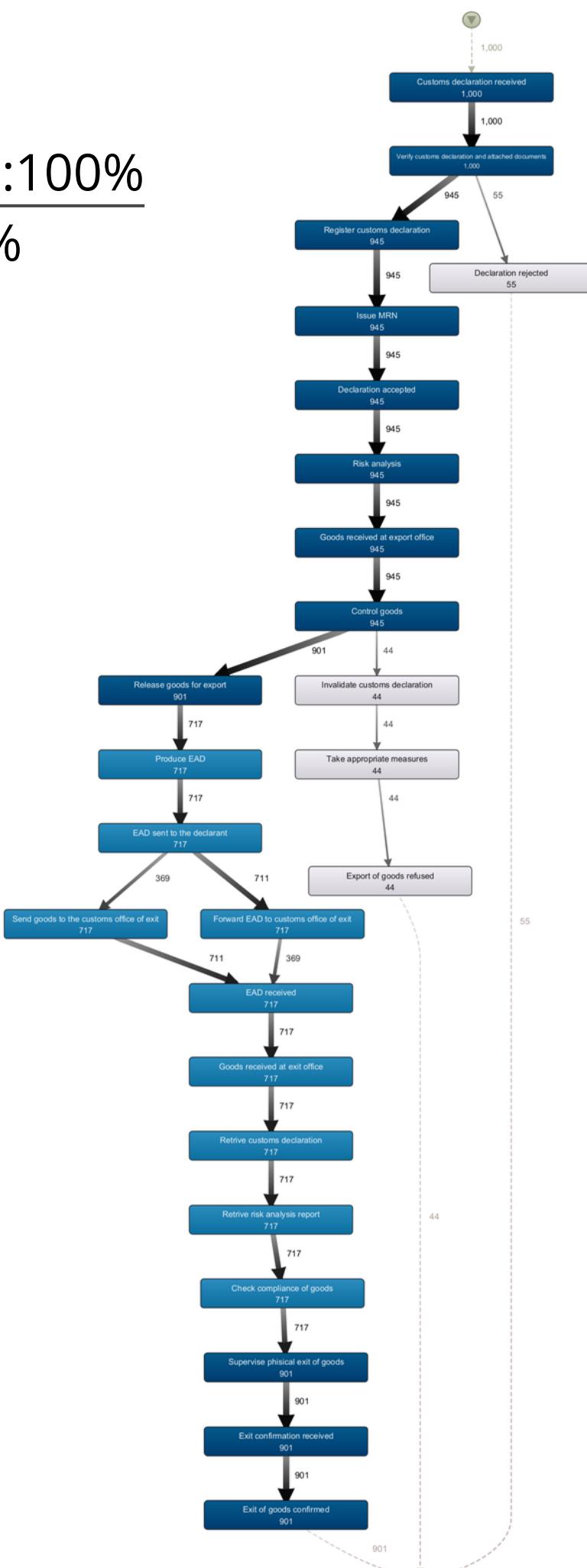
Global statistics



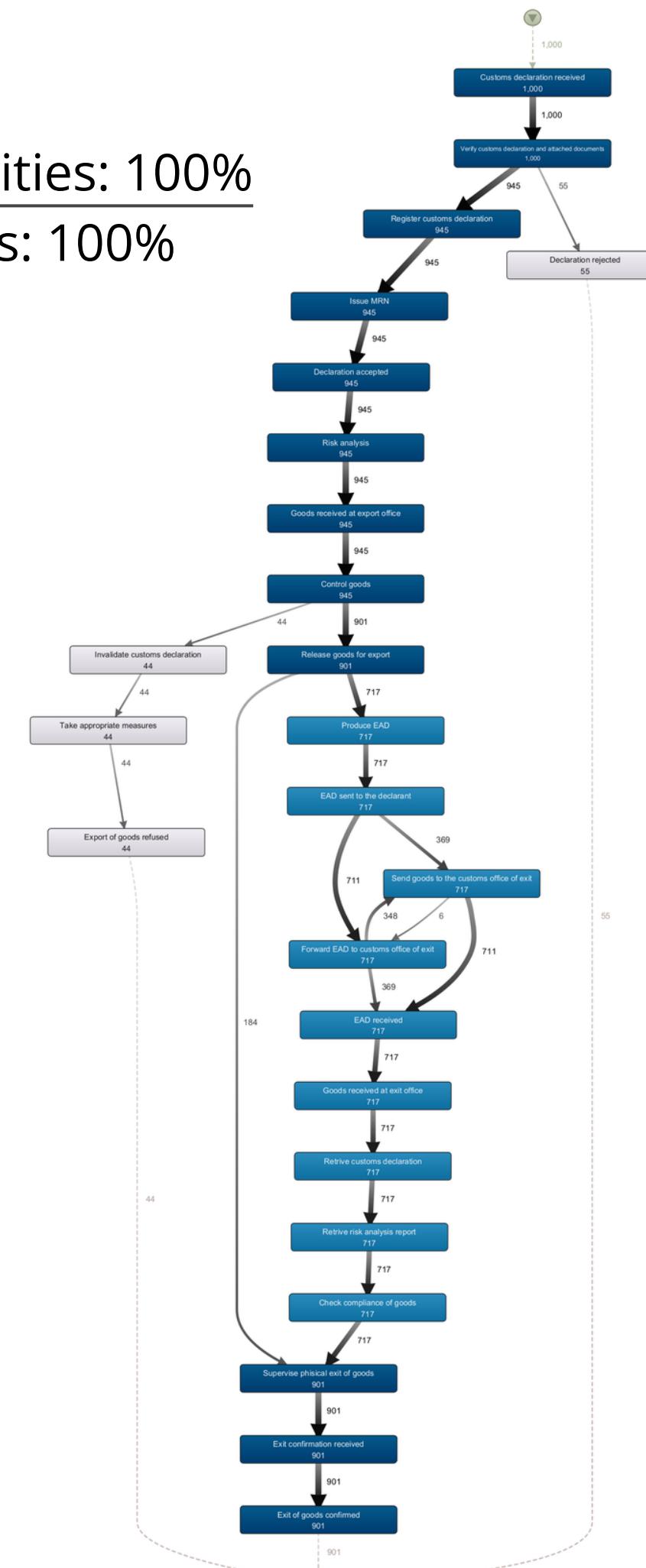
Activities: 0%
Paths: 0%



Activities: 100%
Paths: 0%



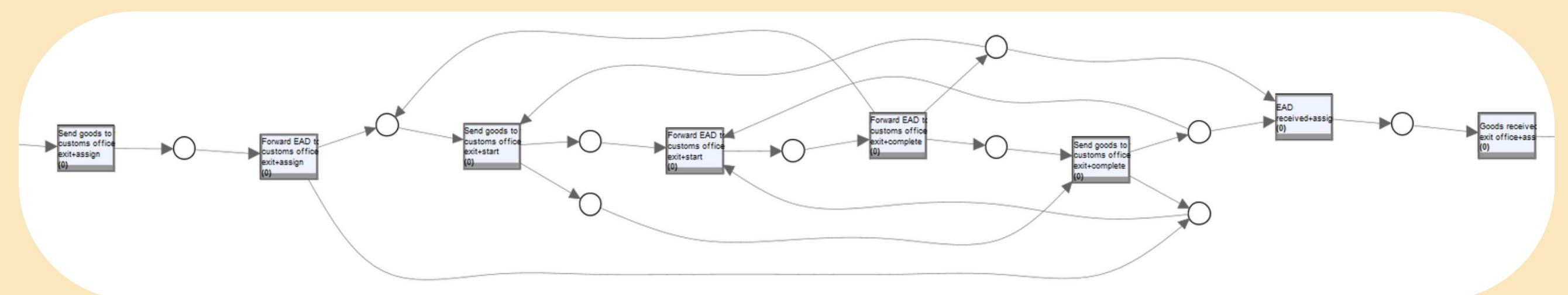
Activities: 100%
Paths: 100%



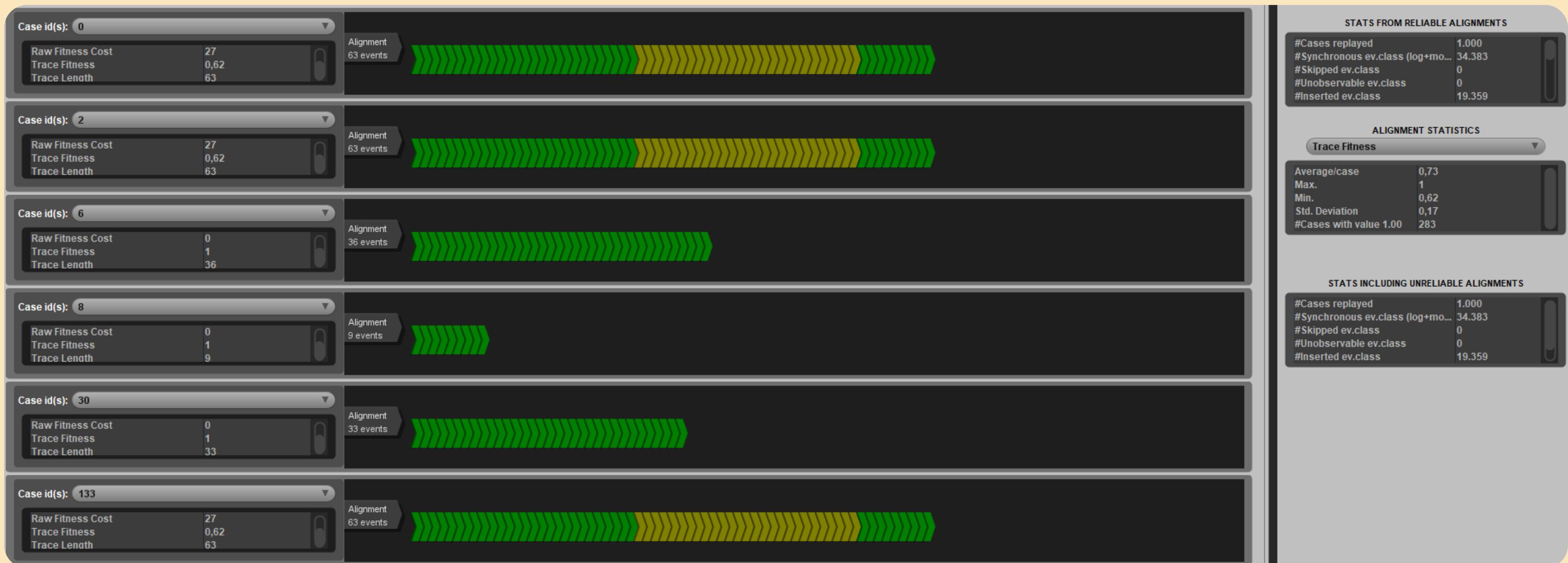
Process Discovery - ProM

Alpha algorithm, several attempts:

- Alpha
- Alpha+
- AlphaR

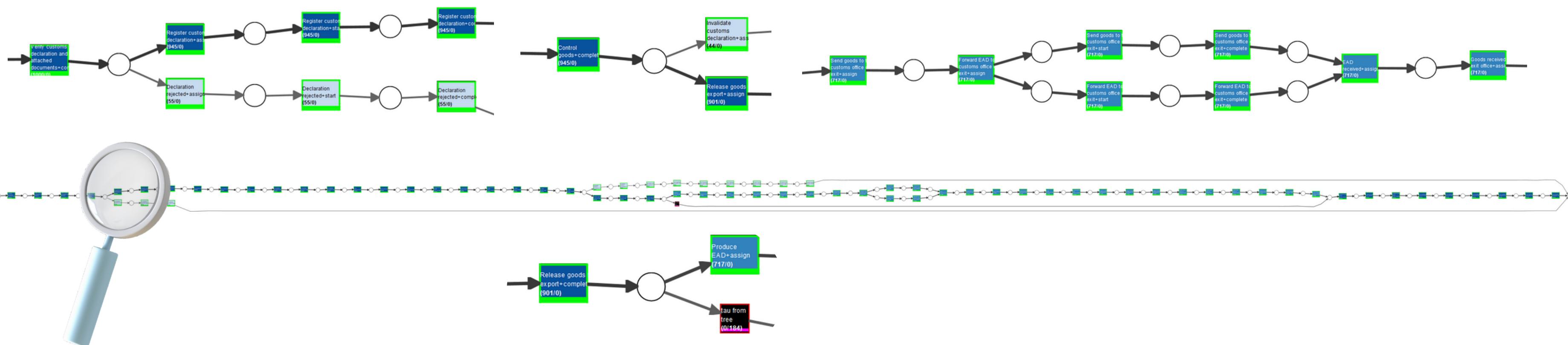


Trace Alignment Alpha Algorithm



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

