Process Management and Mining 2023/2024

Used Car Sales

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Problem Description

The project concerns the development of the process involved in a digital company whose business is to buy/sell used cars. We focused on the first part of this business: The process of buying a used car.

The process starts with the intention from the seller to sell a car, **completing a form** with the main details of the car. The car Description is then processed in a **SW Robot**.

If the SW Robot checks pass, then an operator from the office goes deep in it, **checks again** the Description, as well as the pictures provided by the seller.

Then another operator **propose a deal**, preparing a contract as well as the price and sends it to the seller.

Once the car arrives, mechanics do a **test drive** and perform a **mechanical check**.

If the mechanic found some issue on it, but they're still interested in buying the car, an office worker **computes back a modified price**.

If the seller accepts the modification (or the car was compliant to the contract), we then proceed to the **payment**, then a mechanic stores the car in the warehouse.

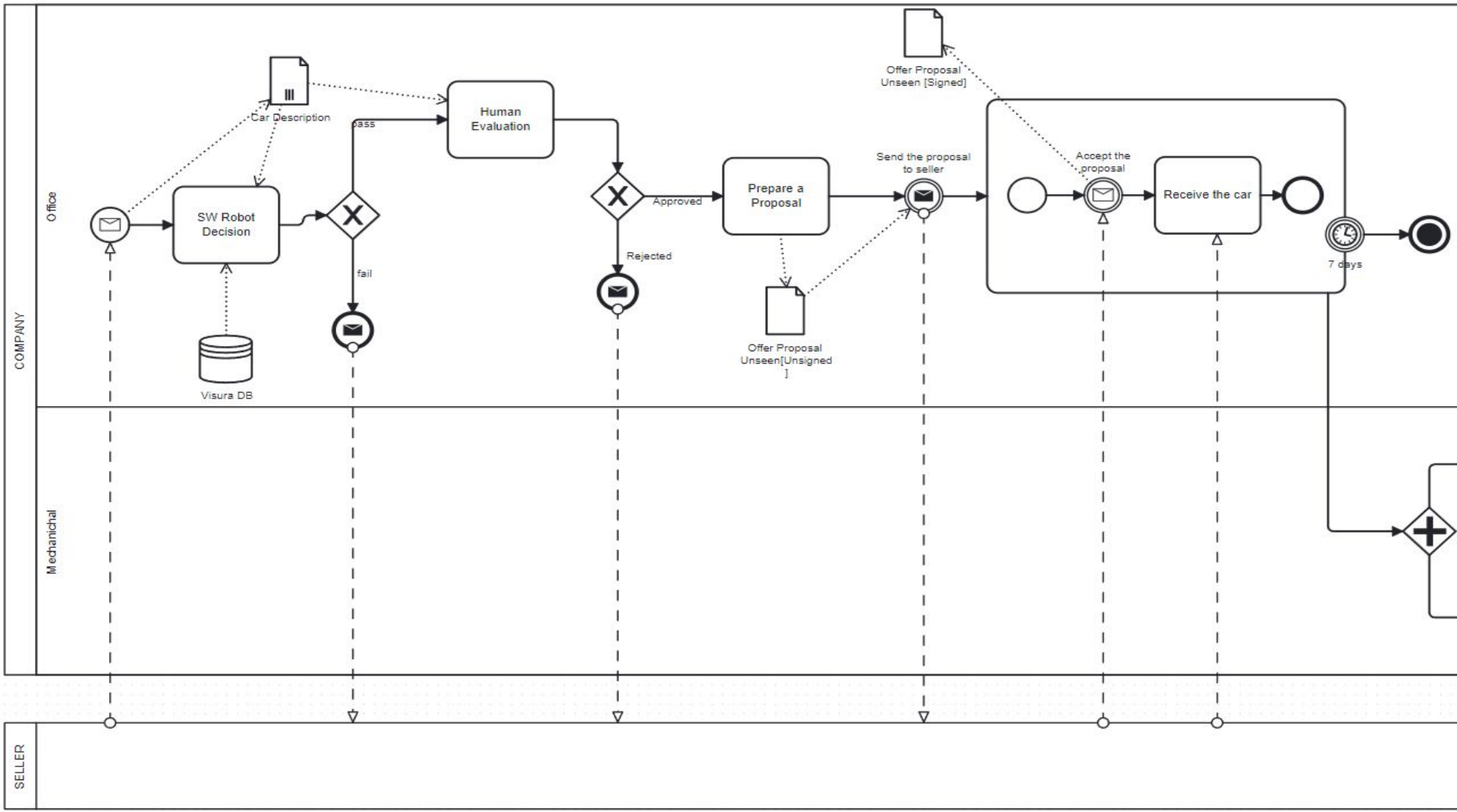
The Office department then does the **ownership change**.

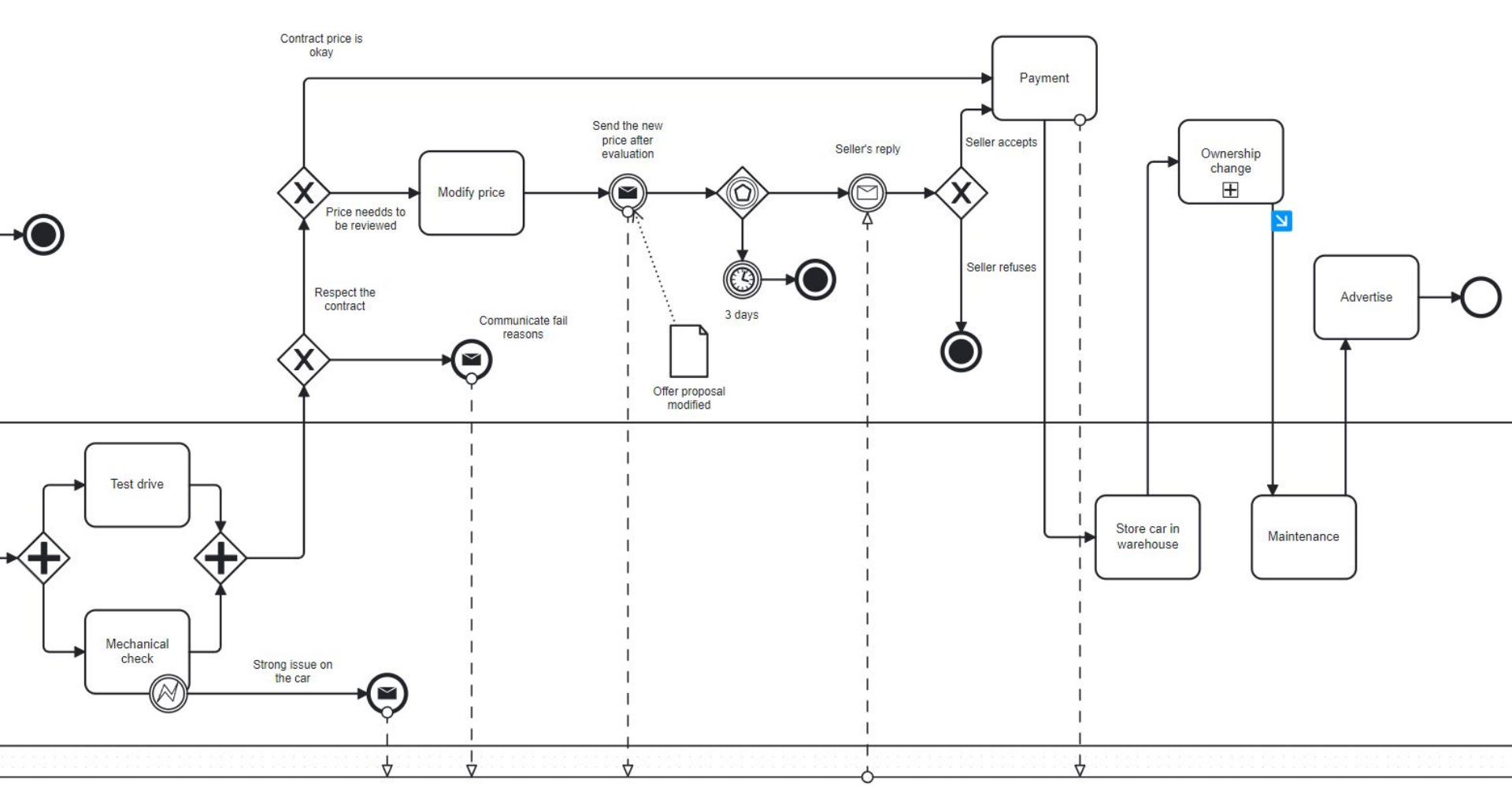
After it the mechanic does the **maintenance** on the car.

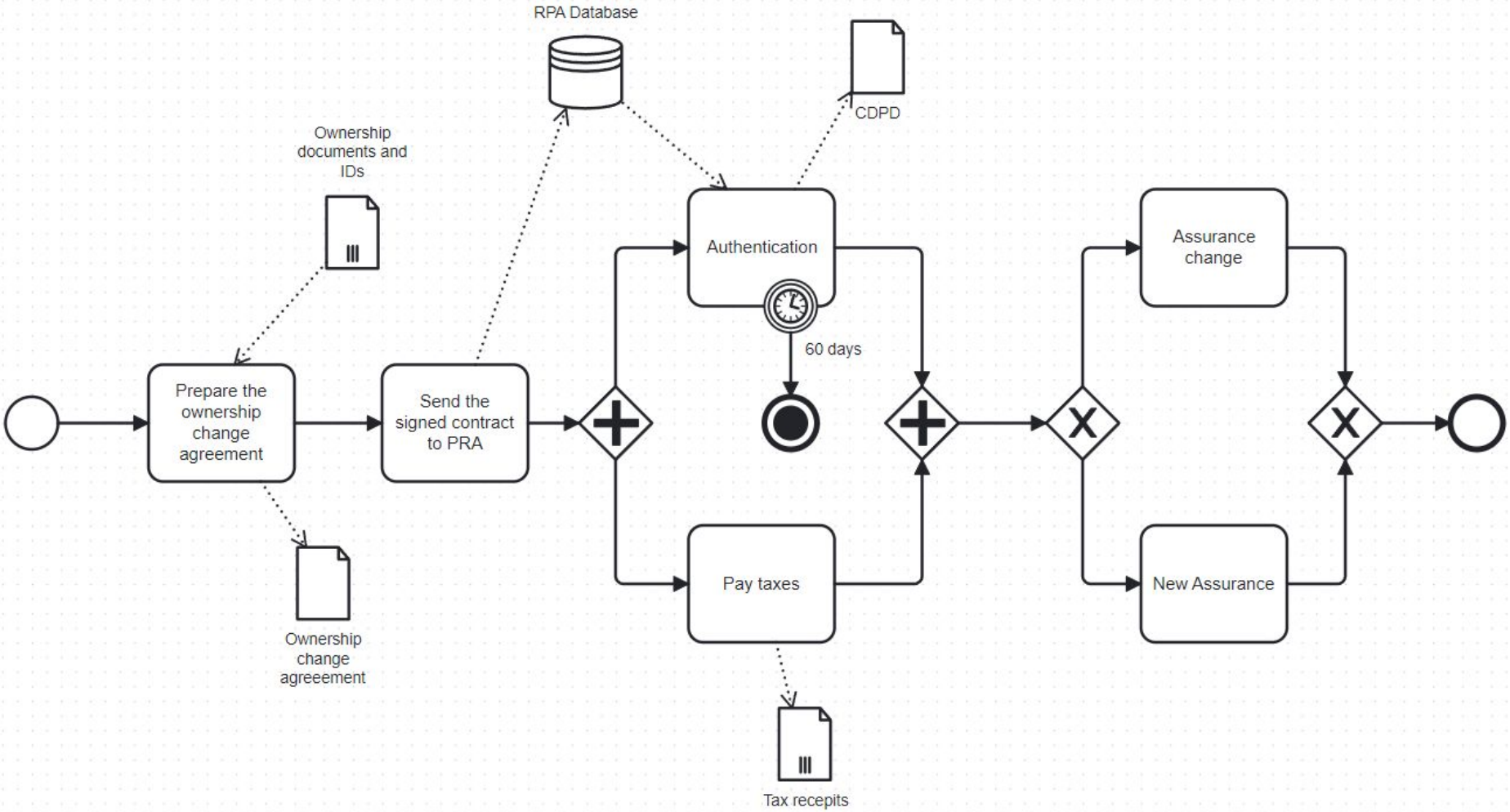
The process ends with the **advertising** of the car from the Office department.

PROCESS MODELLING

Utilised Tool


COMPANY
Office
Mechanichal
SELLER
Car Description
SW Robot Decision
Visura DB
pass
fail
Human Evaluation
Approved
Rejected
Prepare a Proposal
Offer Proposal Unseen[Unsigned]
Offer Proposal Unseen [Signed]
Send the proposal to seller
Accept the proposal
Receive the car
7 days


Contract price is okay
Payment
Send the new price after evaluation
Seller's reply
Seller accepts
Ownership change
Modify price
Price needds to be reviewed
Seller refuses
Advertise
Respect the contract
Communicate fail reasons
3 days
Offer proposal modified
Test drive
Store car in warehouse
Maintenance
Mechanical check
Strong issue on the car


RPA Database
CDPD
Ownership documents and IDs
Authentication
60 days
Assurance change
Prepare the ownership change agreement
Send the signed contract to PRA
Pay taxes
New Assurance
Ownership change agreeement
Tax recepits

Simulation and Analysis

Utilised Tool

Processing Time of activities

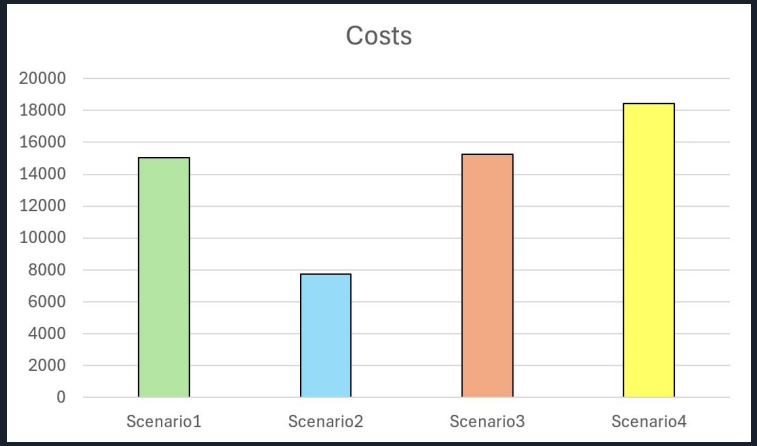
Task	Execution costs	Execution time
SW Robot Decision	€ 0.00	00h 00m
Human Evaluation	€ 0.00	00h 05m
Prepare a Proposal	€ 0.00	01h 00m
Test drive	€ 0.00	00h 10m
Mechanical check	€ 0.00	01h 00m
Modify price	€ 0.00	00h 20m
Payment	€ 0.00	00h 00m 30s
Store car in warehouse	€ 0.00	00h 10m
Ownership change	€ 50.00	02h 30m
Maintenance	€ 200.00	02h 00m
Advertise	€ 3.00	00h 30m

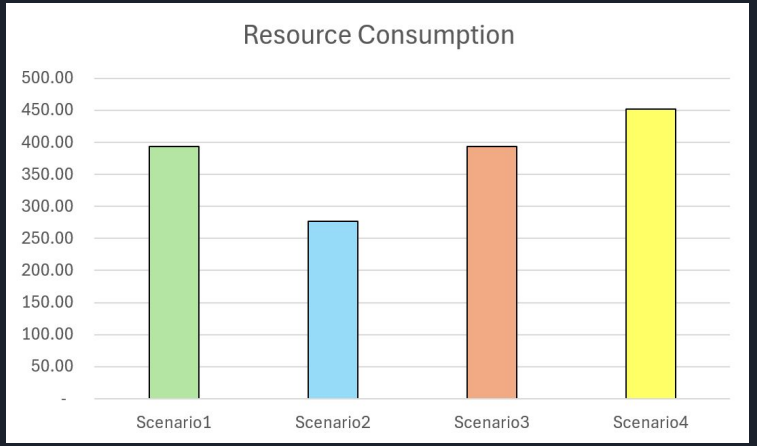
Scenarios

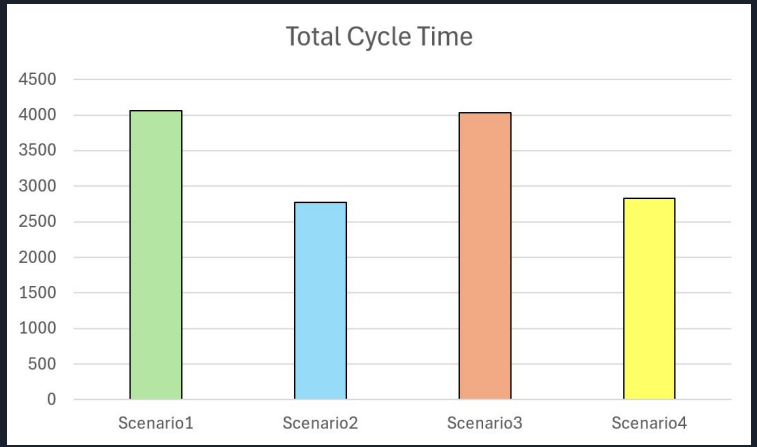
	Mechanical	Office
Scenario 1	3	3
Scenario 2	4	2
Scenario 3	4	3
Scenario 4	4	4

	Cost/hour	Hours per week
Mechanical	12 Eur	40
Office	11 Eur	40

Simulation time duration: 14 days
Number of clients during the simulation: 100


Costs
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Scenario1
Scenario2
Scenario3
Scenario4


Resource Consumption
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
-
Scenario1
Scenario2
Scenario3
Scenario4


Total Cycle Time
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Scenario1
Scenario2
Scenario3
Scenario4

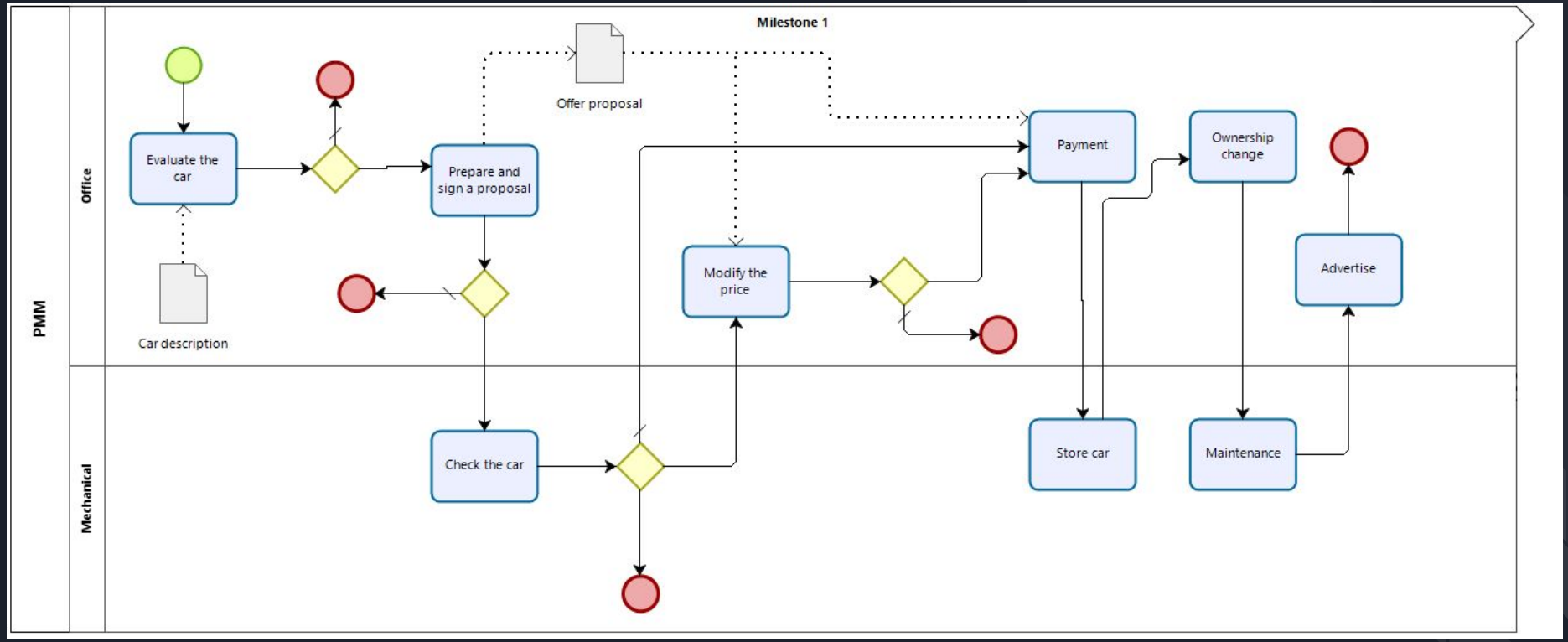

Average Waiting Time
300
250
200
150
100
50
0
Scenario1
Scenario2
Scenario3
Scenario4

PROCESS EXECUTION

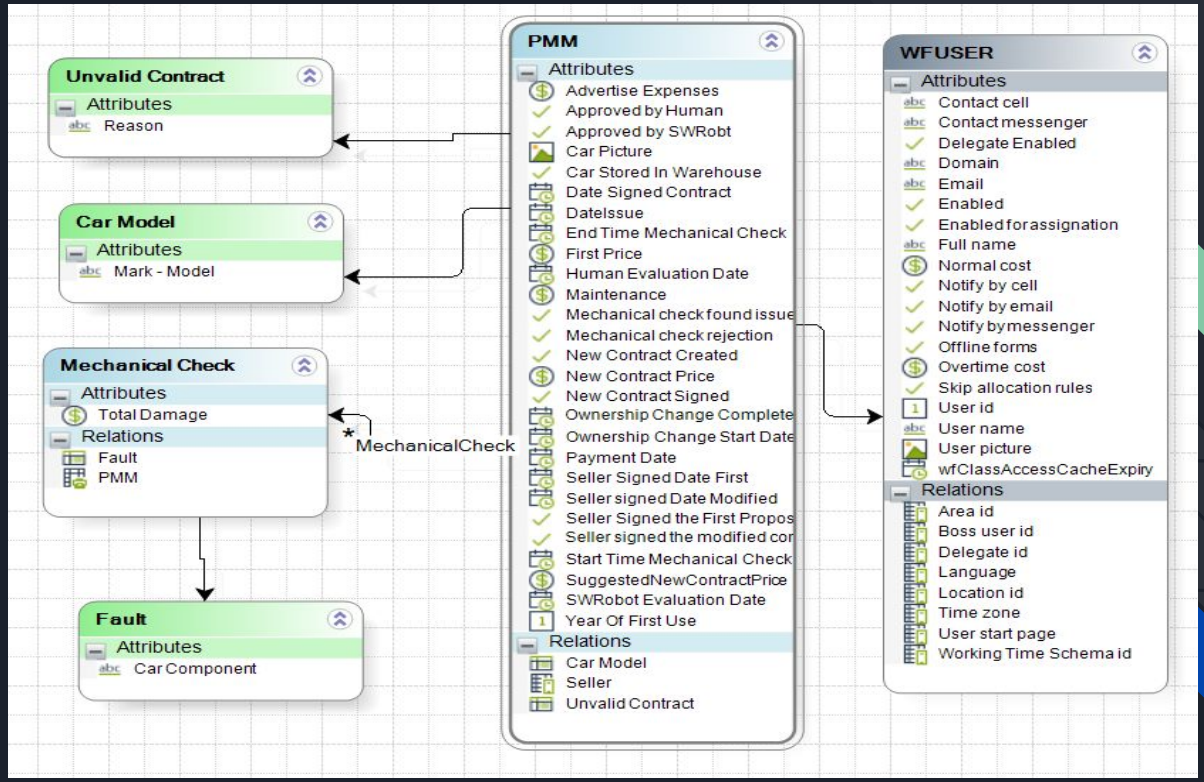
Utilised Tool

bizagi Studio

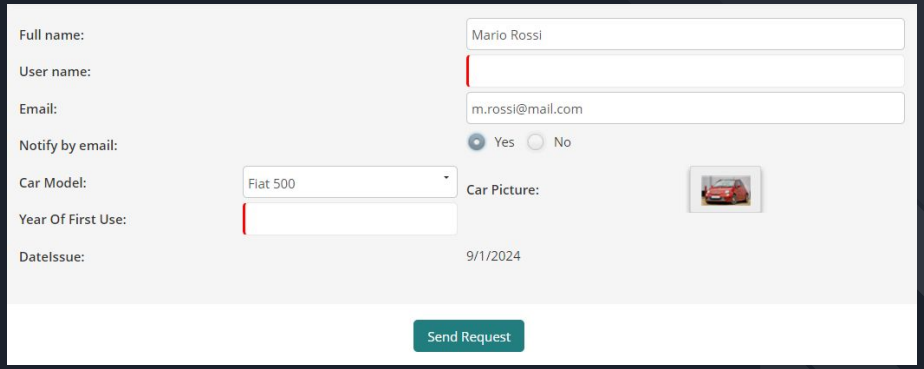
1. Process Model for Execution

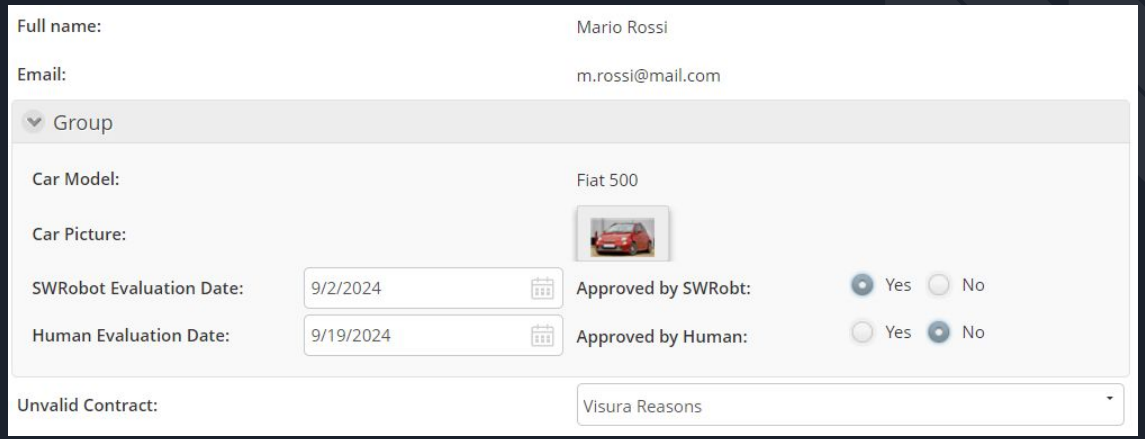


2. DATA MODEL

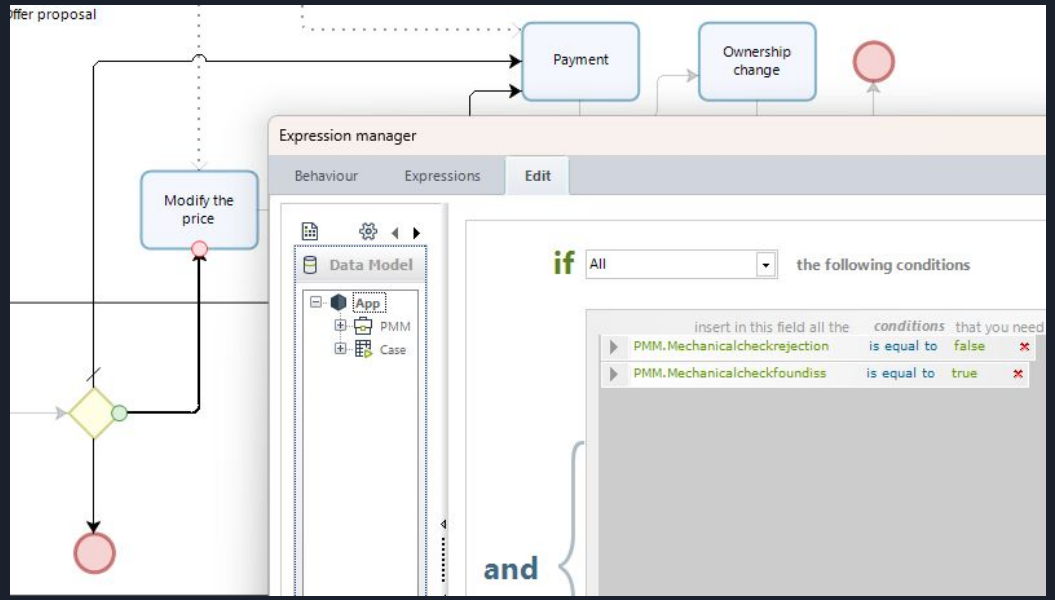

Unvalid Contract
Attributes
Reason
Car Model
Attributes
Mark - Model
Mechanical Check
Attributes
Total Damage
Relations
Fault
PMM
Fault
Attributes
Car Component
MechanicalCheck
PMM
Attributes
Advertise Expenses
Approved by Human
Approved by SWRobt
Car Picture
Car Stored In Warehouse
Date Signed Contract
DateIssue
End Time Mechanical Check
First Price
Human Evaluation Date
Maintenance
Mechanical check found issue
Mechanical check rejection
New Contract Created
New Contract Price
New Contract Signed
Ownership Change Complete
Ownership Change Start Date
Payment Date
Seller Signed Date First
Seller signed Date Modified
Seller Signed the First Propos
Seller signed the modified cor
Start Time Mechanical Check
SuggestedNewContractPrice
SWRobot Evaluation Date
Year Of First Use
Relations
Car Model
Seller
Unvalid Contract
WFUSER
Attributes
Contact cell
Contact messenger
Delegate Enabled
Domain
Email
Enabled
Enabled for assignation
Full name
Normal cost
Notify by cell
Notify by email
Notify by messenger
Offline forms
Overtime cost
Skip allocation rules
User id
User name
User picture
wfClassAccessCacheExpiry
Relations
Area id
Boss user id
Delegate id
Language
Location id
Time zone
User start page
Working Time Schema id

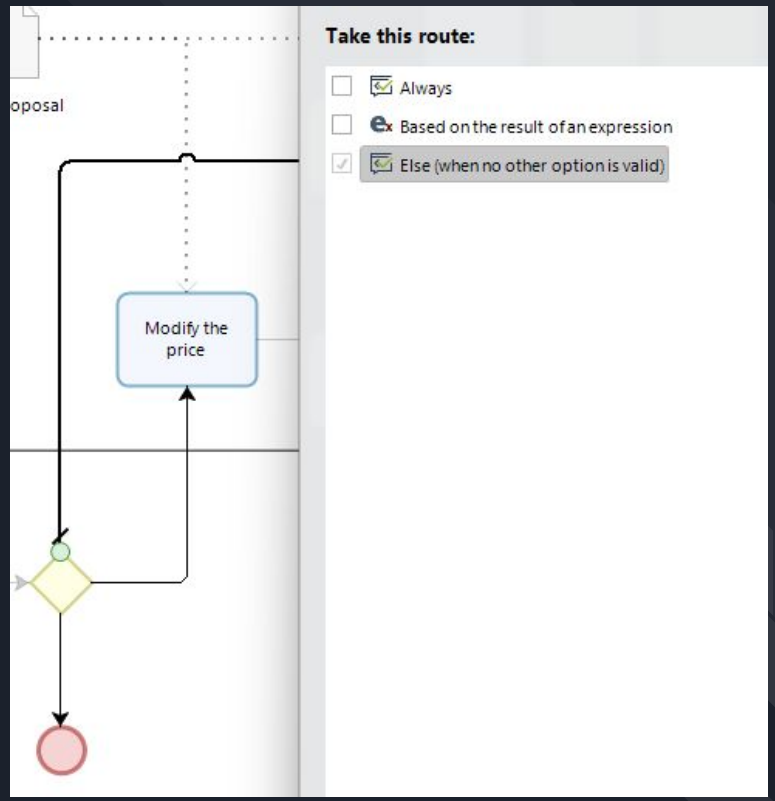
3. Define Forms



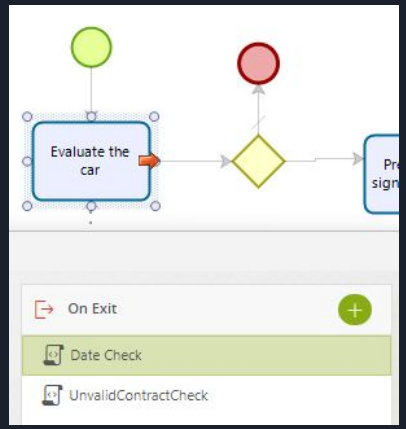


4. Business Rules - Define expressions





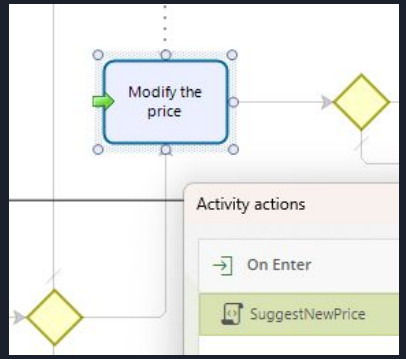
4. Business Rules - Activity Actions




```
if ((<PMM.ApprovedbyHuman> == false) && (<PMM.UnvalidContract> == null) ) {
 CHelper.ThrowValidationError("You must specify a reason when human do not approve");
}

if ((<PMM.ApprovedbyHuman> == true) && (<PMM.UnvalidContract> != null) ) {
 CHelper.ThrowValidationError("You cannot say contract is approved by human while specif
}
```

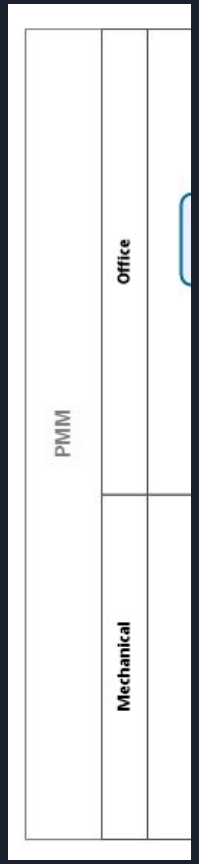
```
if(<greater-than(PMM.swRobotApprovedDate,PMM.humanEvaluationApprovedDat)>)
{
CHelper.ThrowValidationError("The SWRobot must occur before the request Human Validation")
}
```

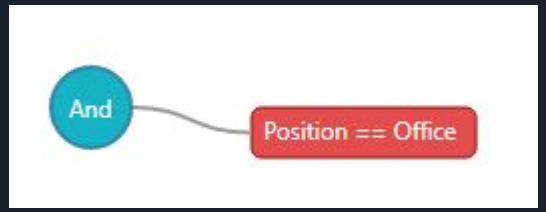



```
<PMM.suggestedNewContractPrice> = <sum(PMM.MechanicalCheck.totalDamage)>
<PMM.suggestedNewContractPrice> += <PMM.FirstPrice>
```

First Price:	$3,000.00
SuggestedNewContractPrice:	$3,210.00
New Contract Price:	3210

5. Performers

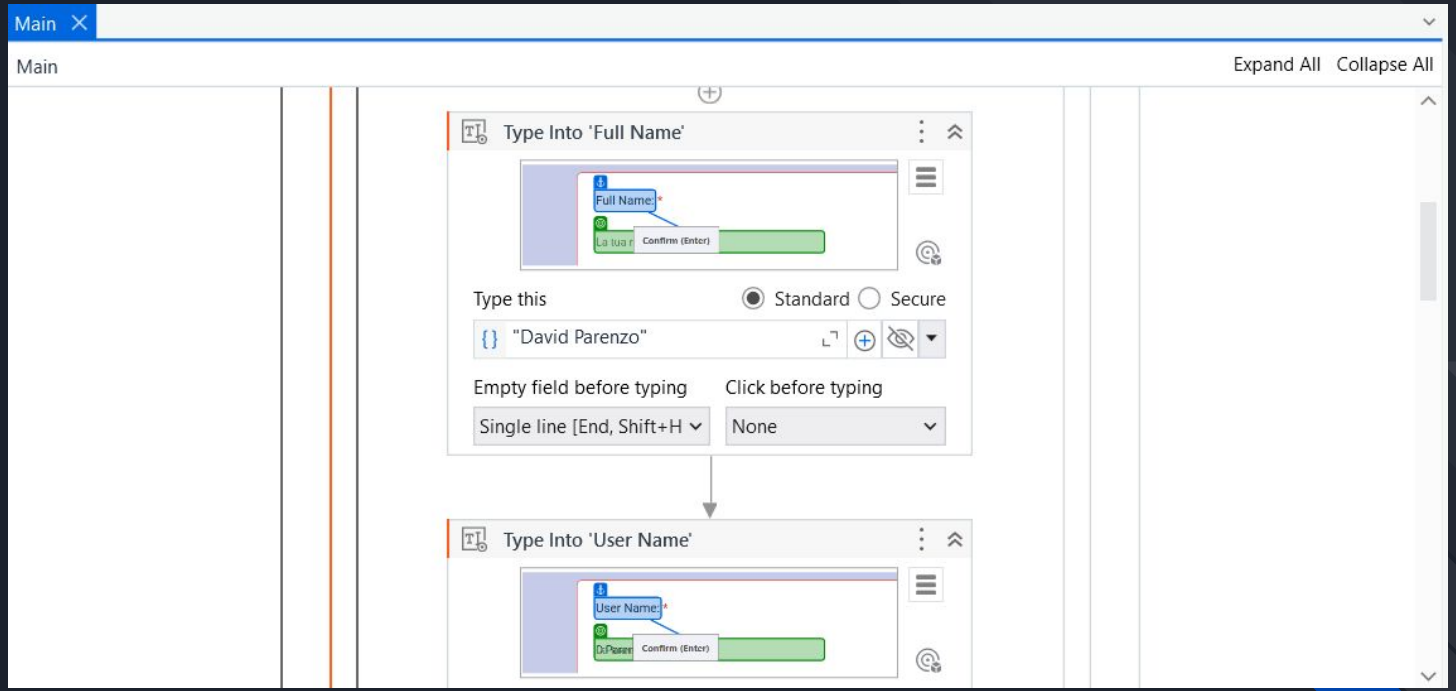




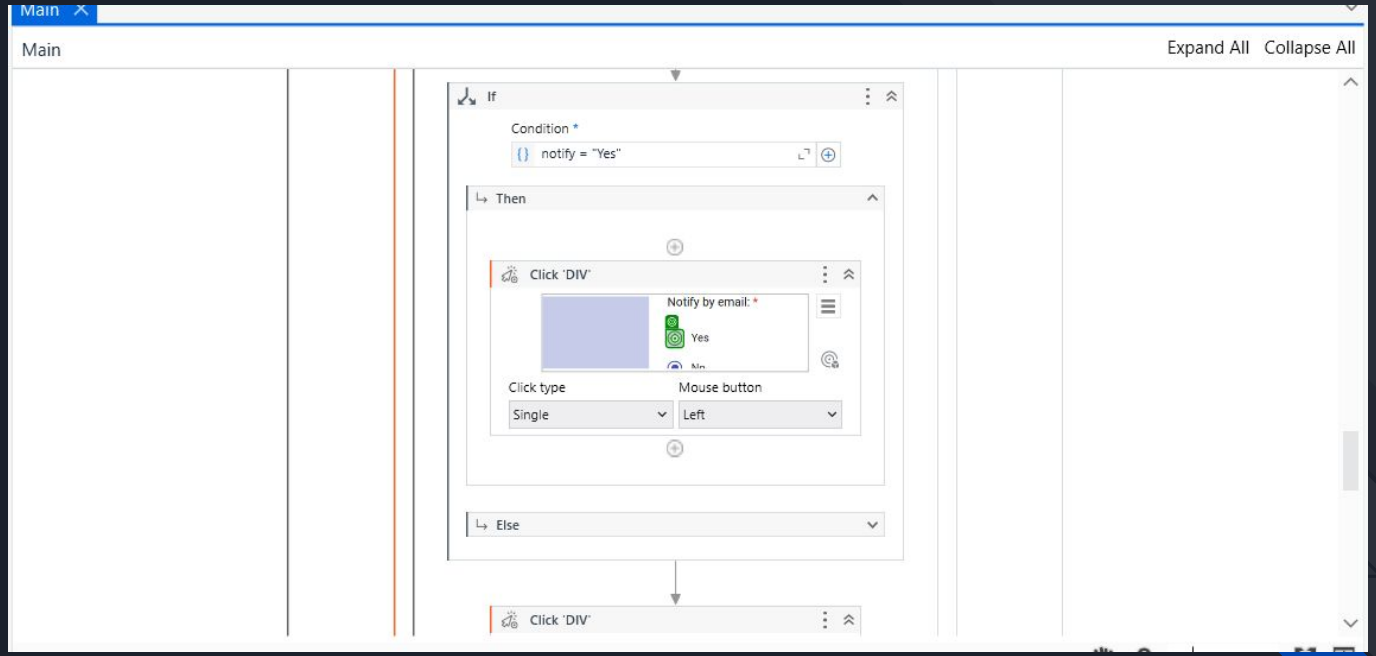
AUTOMATION

Utilised Tool

1. Recording


Main
Main
Expand All
Collapse All
Type Into 'Full Name'
Full Name:
Confirm (Enter)
Type this
Standard
Secure
"David Parenzo"
Empty field before typing
Click before typing
Single line [End, Shift+H
None
Type Into 'User Name'
User Name:
Confirm (Enter)

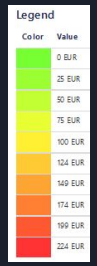
2. Automatic Compilation



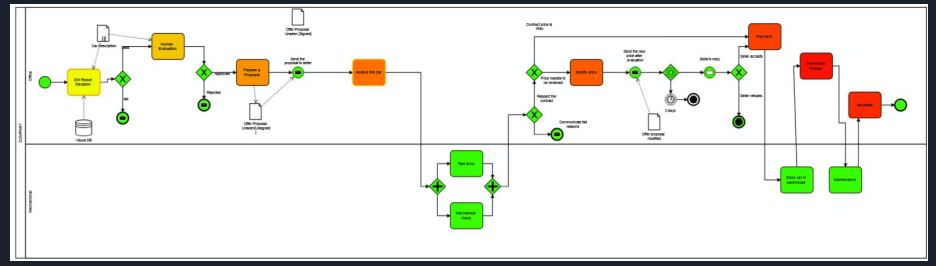
MINING

Utilised Tools

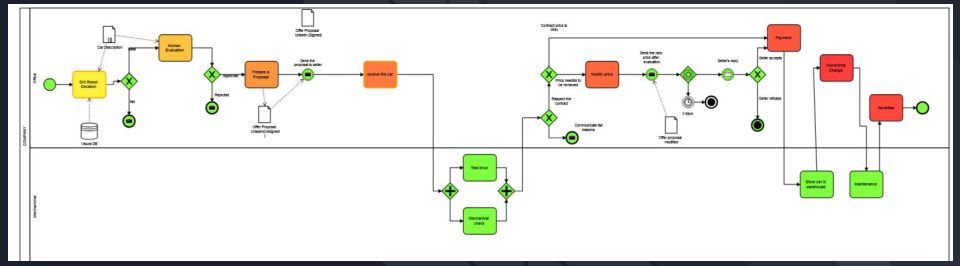
1. BIMP for generating Event Log

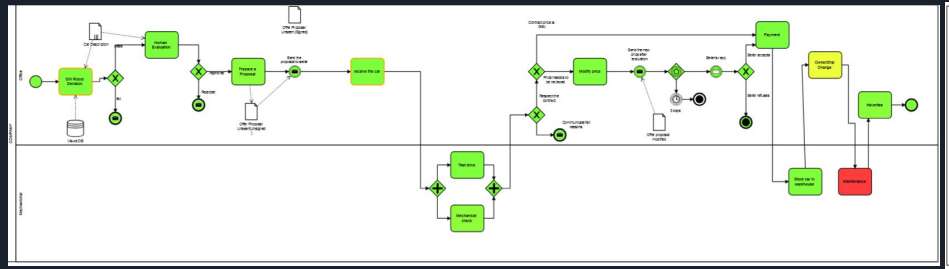


Waiting Times

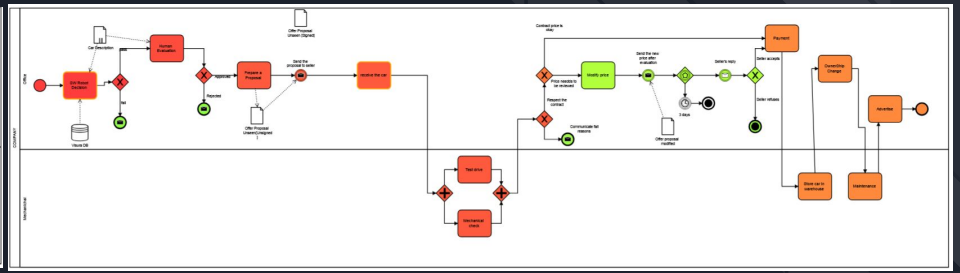


Durations



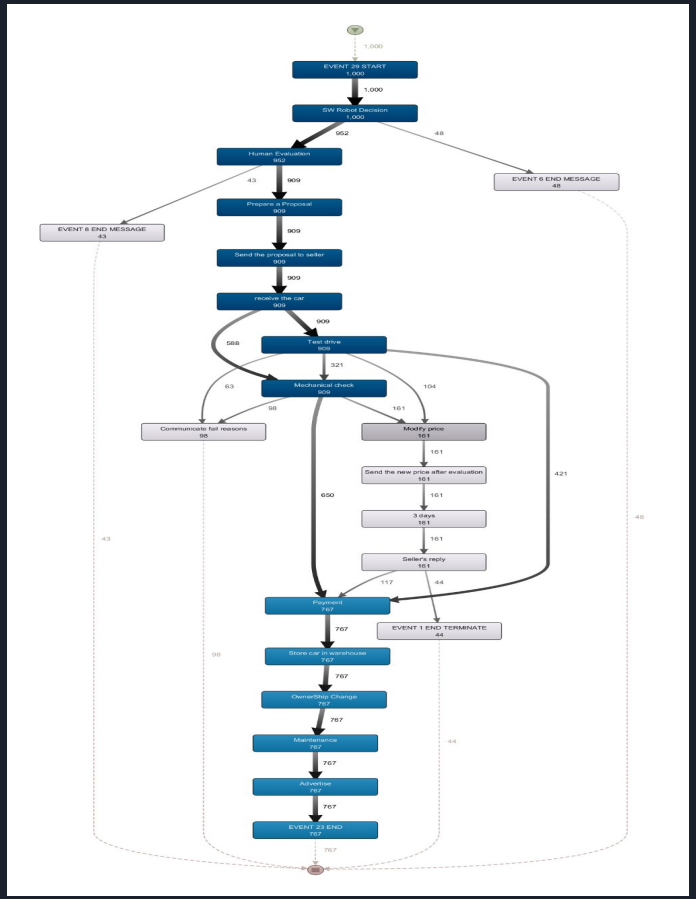


Costs

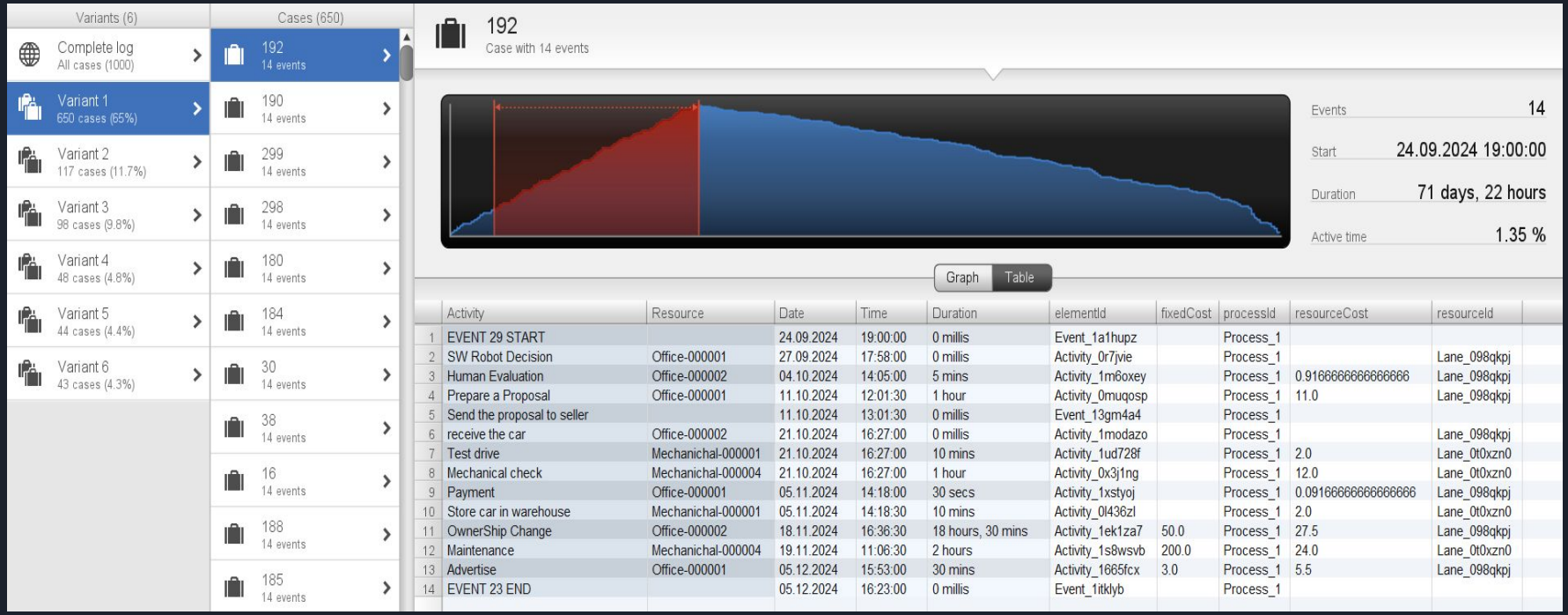


Counts

2. DISCO for discover Process Model

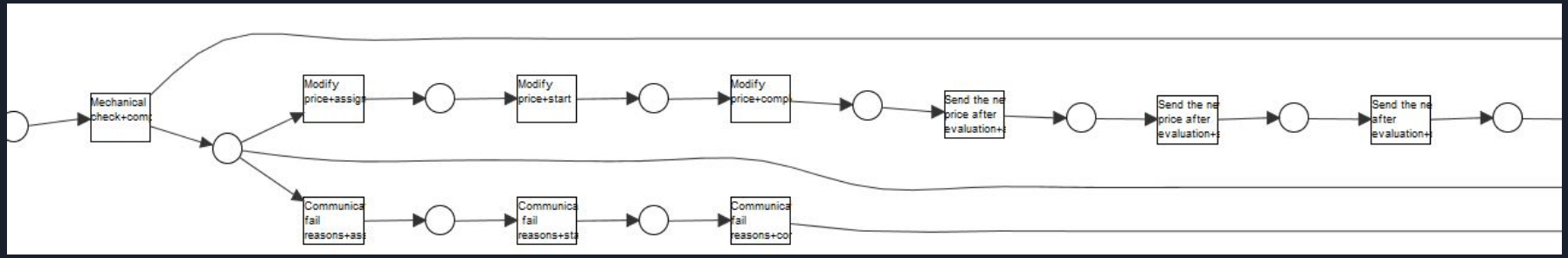


2.Disco: Cases and Variants

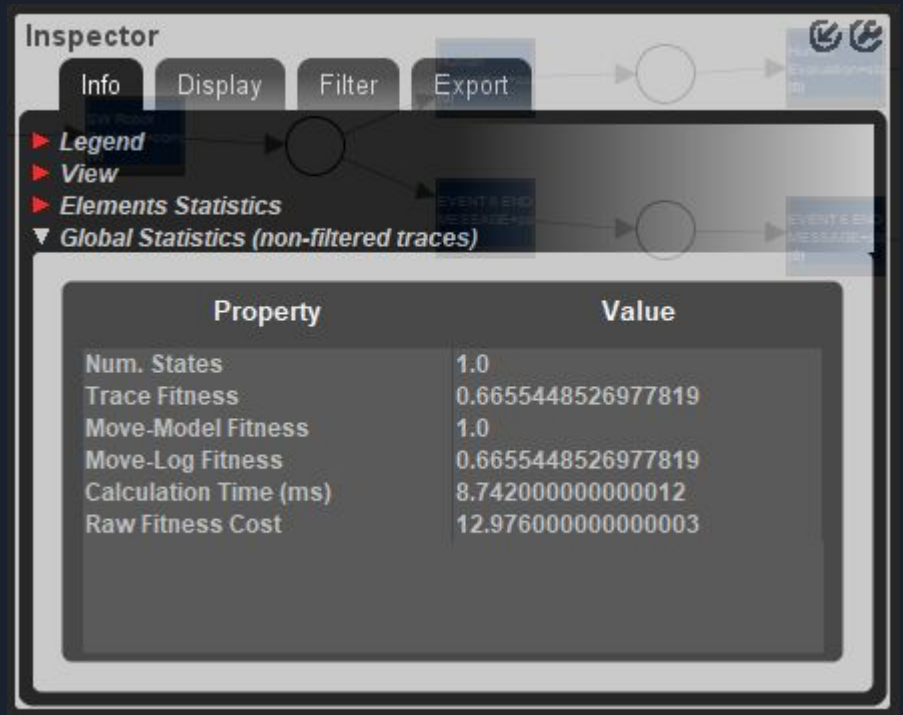


	Activity	Resource	Date	Time	Duration	elementId	fixedCost	processId	resourceCost	resourceId
1	EVENT 29 START		24.09.2024	19:00:00	0 millis	Event_1a1hupz		Process_1		
2	SW Robot Decision	Office-000001	27.09.2024	17:58:00	0 millis	Activity_0r7jvie		Process_1		Lane_098qkpj
3	Human Evaluation	Office-000002	04.10.2024	14:05:00	5 mins	Activity_1m6oxey		Process_1	0.9166666666666666	Lane_098qkpj
4	Prepare a Proposal	Office-000001	11.10.2024	12:01:30	1 hour	Activity_0muqosp		Process_1	11.0	Lane_098qkpj
5	Send the proposal to seller		11.10.2024	13:01:30	0 millis	Event_13gm4a4		Process_1		
6	receive the car	Office-000002	21.10.2024	16:27:00	0 millis	Activity_1modazo		Process_1		Lane_098qkpj
7	Test drive	Mechanichal-000001	21.10.2024	16:27:00	10 mins	Activity_1ud728f		Process_1	2.0	Lane_0t0xzn0
8	Mechanical check	Mechanichal-000004	21.10.2024	16:27:00	1 hour	Activity_0x3j1ng		Process_1	12.0	Lane_0t0xzn0
9	Payment	Office-000001	05.11.2024	14:18:00	30 secs	Activity_1xstyoj		Process_1	0.09166666666666666	Lane_098qkpj
10	Store car in warehouse	Mechanichal-000001	05.11.2024	14:18:30	10 mins	Activity_0l436zl		Process_1	2.0	Lane_0t0xzn0
11	OwnerShip Change	Office-000002	18.11.2024	16:36:30	18 hours, 30 mins	Activity_1ek1za7	50.0	Process_1	27.5	Lane_098qkpj
12	Maintenance	Mechanichal-000004	19.11.2024	11:06:30	2 hours	Activity_1s8wsvb	200.0	Process_1	24.0	Lane_0t0xzn0
13	Advertise	Office-000001	05.12.2024	15:53:00	30 mins	Activity_1665fcx	3.0	Process_1	5.5	Lane_098qkpj
14	EVENT 23 END		05.12.2024	16:23:00	0 millis	Event_1itklyb		Process_1		

3. PROM to generate Petri Net



4. PROM


Inspector
Info
Display
Filter
Export
Legend
View
Elements Statistics
Global Statistics (non-filtered traces)
Property
Value
Num. States
1.0
Trace Fitness
0.6655448526977819
Move-Model Fitness
1.0
Move-Log Fitness
0.6655448526977819
Calculation Time (ms)
8.742000000000012
Raw Fitness Cost
12.976000000000003

THANKS FOR THE ATTENTION