CONSTRUCCIÓ D'UN DATASET PER A L'EXTRACCIÓ DE BPMN A PARTIR DE TEXTOS

Autor: **Guillem Pla Bertran**

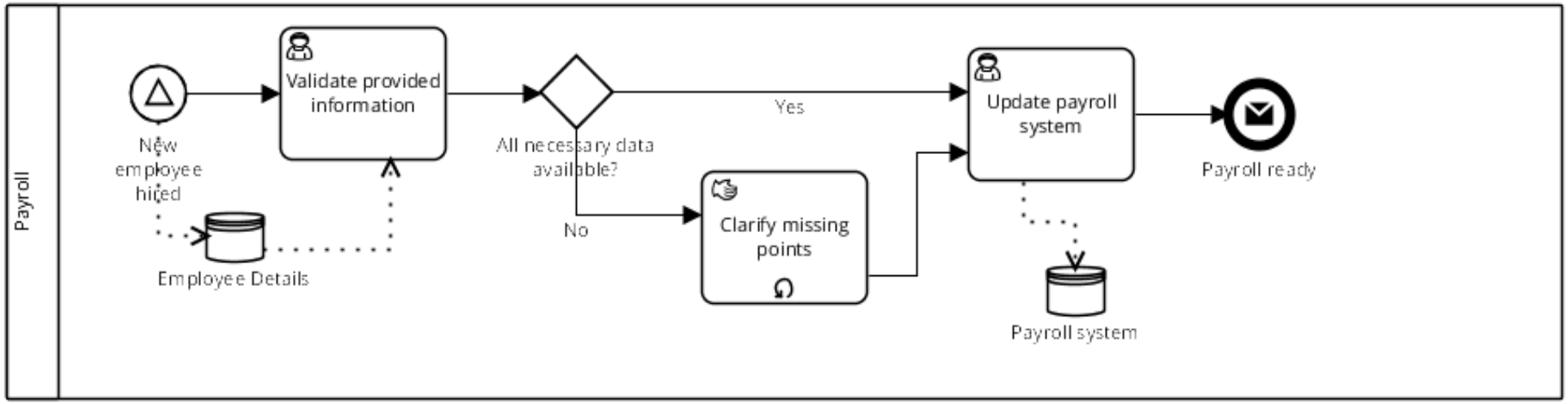
Director: **Josep Carmona Vargas**

Codirector: **Lluís Padró Cirera**

GEI - FIB - UPC

ÍNDEX

CONTEXT


Payroll
New employee hired
Validate provided information
Employee Details
All necessary data available?
Yes
No
Clarify missing points
Update payroll system
Payroll system
Payroll ready

PROBLEMA A RESOLDRE

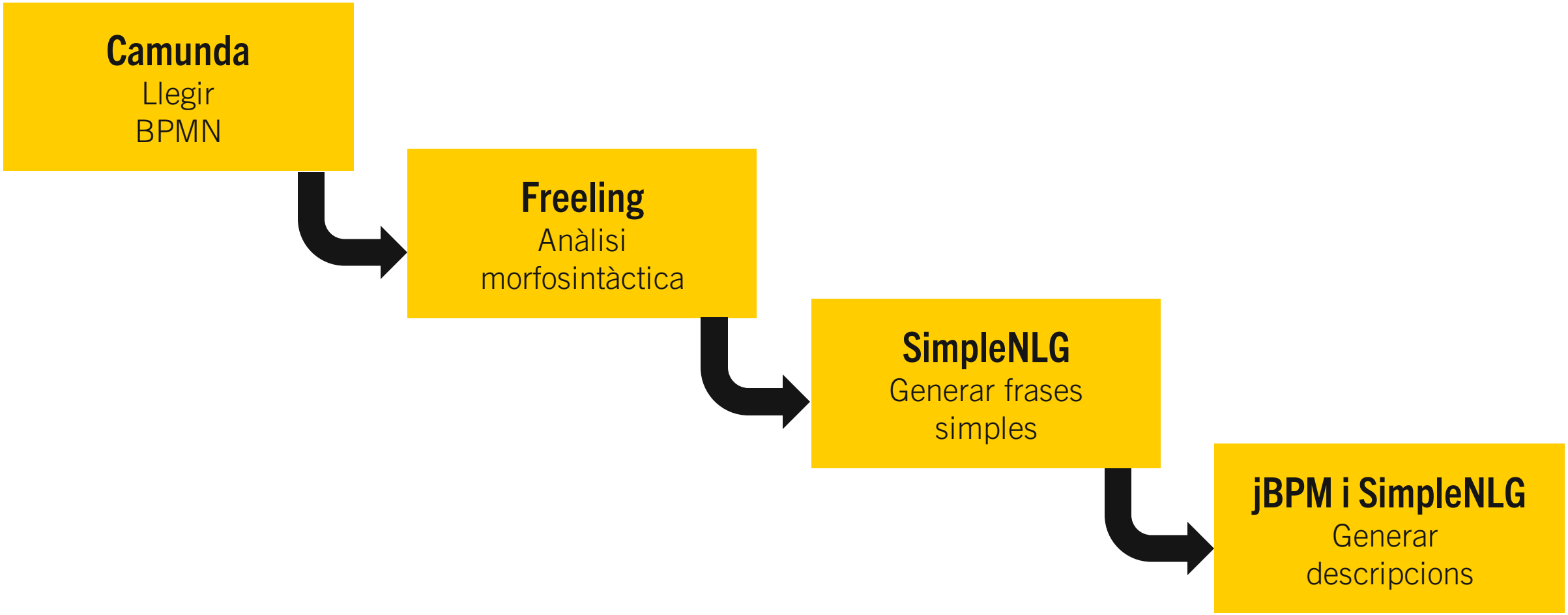
- Les empreses utilitzen diagrames BPMN per a definir formalment un procés
- Crear un diagrama BPMN té un cost molt elevat
- Es podria automatitzar la creació dels diagrames a partir de descripcions en llenguatge natural
- Falten dades per a entrenar un model de **Deep Learning**

OBJECTIUS

Generar un **DATASET**

- Llegir BPMNs
- Fer l'anàlisi morfosintàctica
- Crear frases simples
- Crear descripcions dels BPMN

SOLUCIÓ PLANTEJADA



CAMUNDA

- Exemple del XML d'un BPMN
- **Camunda** llegeix aquest fitxer i el trasforma en objectes de **Java**

```
<?xml version="1.0" encoding="UTF-8"?>
<bpmn:definitions xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:bpmn="http://www.omg.org/spec/BPMN/20100524/
  <bpmn:process id="Process_1va2xkv" isExecutable="false">
    <bpmn:startEvent id="StartEvent_0cmqjjn" name="hunger noticed">
      <bpmn:outgoing>Flow_1oxhnz0</bpmn:outgoing>
    </bpmn:startEvent>
    <bpmn:task id="Activity_0h8zmo2" name="choose recipe">
      <bpmn:incoming>Flow_1oxhnz0</bpmn:incoming>
      <bpmn:outgoing>Flow_1o4h22g</bpmn:outgoing>
    </bpmn:task>
    <bpmn:sequenceFlow id="Flow_1oxhnz0" sourceRef="StartEvent_0cmqjjn" targetRef="Activity_0h8zmo2" />
    <bpmn:inclusiveGateway id="Gateway_03awr2x" name="desired components?">
      <bpmn:incoming>Flow_1o4h22g</bpmn:incoming>
      <bpmn:outgoing>Flow_036b9y3</bpmn:outgoing>
      <bpmn:outgoing>Flow_1e69zqd</bpmn:outgoing>
    </bpmn:inclusiveGateway>
    <bpmn:sequenceFlow id="Flow_1o4h22g" sourceRef="Activity_0h8zmo2" targetRef="Gateway_03awr2x" />
    <bpmn:exclusiveGateway id="Gateway_07n6c25" name="desired dish?">
      <bpmn:incoming>Flow_036b9y3</bpmn:incoming>
      <bpmn:outgoing>Flow_09hfp9k</bpmn:outgoing>
      <bpmn:outgoing>Flow_04cu6uv</bpmn:outgoing>
    </bpmn:exclusiveGateway>
    <bpmn:sequenceFlow id="Flow_036b9y3" name="something real" sourceRef="Gateway_03awr2x" targetRef="Gateway_07n6c25" />
    <bpmn:task id="Activity_06uat0v" name="cook pasta">
      <bpmn:incoming>Flow_09hfp9k</bpmn:incoming>
      <bpmn:outgoing>Flow_0xc9w6y</bpmn:outgoing>
    </bpmn:task>
    <bpmn:sequenceFlow id="Flow_09hfp9k" name="pasta" sourceRef="Gateway_07n6c25" targetRef="Activity_06uat0v" />
    <bpmn:task id="Activity_0z8dfu5" name="cook steak">
      <bpmn:incoming>Flow_04cu6uv</bpmn:incoming>
```

FREELING

- El Freeling retorna un JSON
- **Subjecte**: Lane
- **Verb**: `predL`
- **Objecte**: `objW`
- **Informació de l'objecte**: `objMSD`
- **Complement**: `compW`

Frase a tractar: *Send email messages to the customers*


```
"sentence" :
    "send email messages to the customers",
"actions" :
    "predW" : "send",
    "predF" : "send",
    "predL" : "send",
    "predPoS" : "VB",
    "predMSD" : "pos=verb|vform=infinitive",
    "objW" : "email messages",
    "objF" : "messages",
    "objL" : "message",
    "objPoS" : "NNS",
    "objMSD" : "pos=noun|type=common|num=plural",
    "compW" : "to the customers",
    "compF" : "customers",
    "compL" : "customer",
    "compPoS" : "NNS",
    "compMSD" : "pos=noun|type=common|num=plural"
```

SIMPLENLG

Crear una frase

- Creació de la frase

```
SPhraseSpec p = nlgFactory.createClause();
p.setSubject("Manager");
p.setVerb("send");
p.setObject("the request");
```

- Convertir (realitzar) la frase en un *string* i mostrar-la per pantalla

```
String output = realiser.realiseSentence(p); // Realiser creat anteriorment
System.out.println(output);
```

- Resultat

```
Manager sends the request.
```

Unir diverses frases

- Creació de la frase

```
SPhraseSpec s1 = nlgFactory.createClause("manager sends the request");
SPhraseSpec s2 = nlgFactory.createClause("waits for a response);
SPhraseSpec s3 = nlgFactory.createClause("closes the request);

CoordinatedPhraseElement c = nlgFactory.createCoordinatedPhrase();
c.addCoordinate(s1);
c.addCoordinate(s2);
c.addCoordinate(s3);
```

- Convertir (realitzar) la frase en un *string* i mostrar-la per pantalla

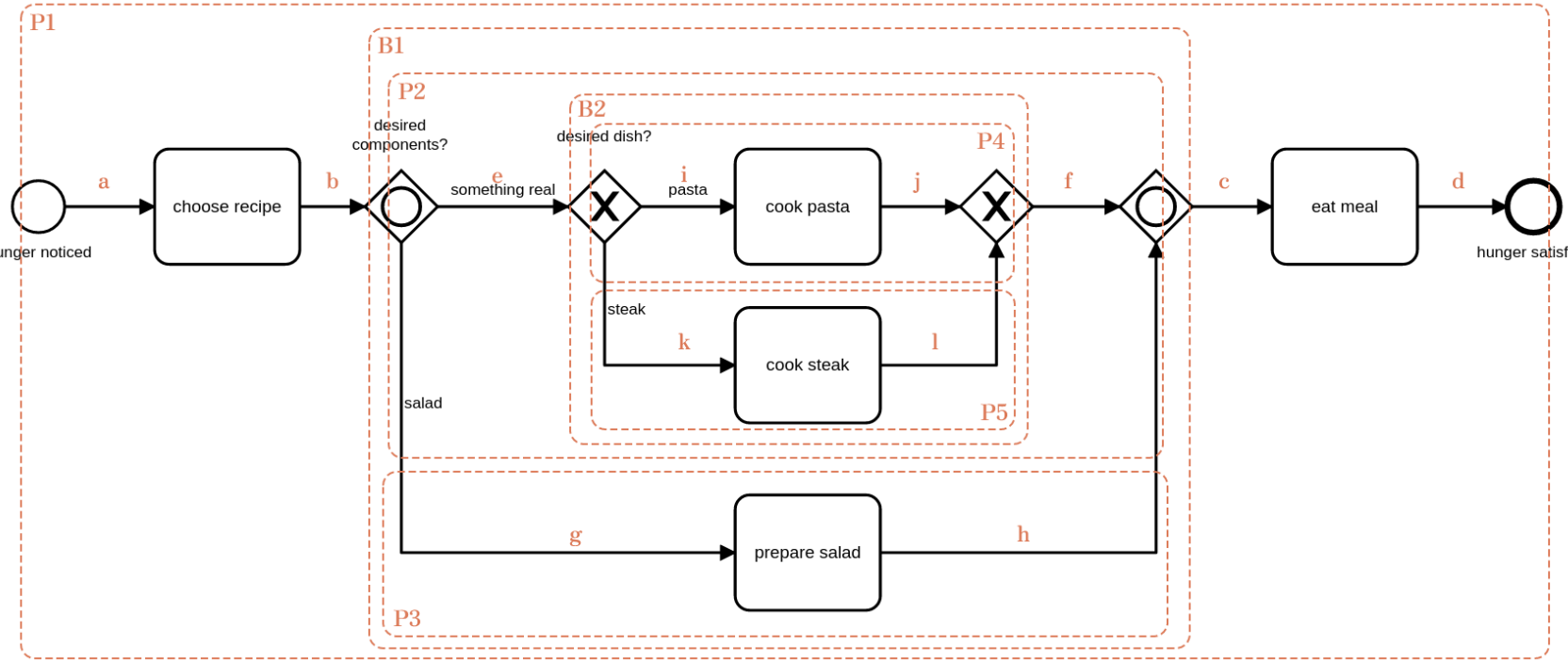
```
String output = realiser.realiseSentence(p); // Realiser creat anteriorment
System.out.println(output);
```

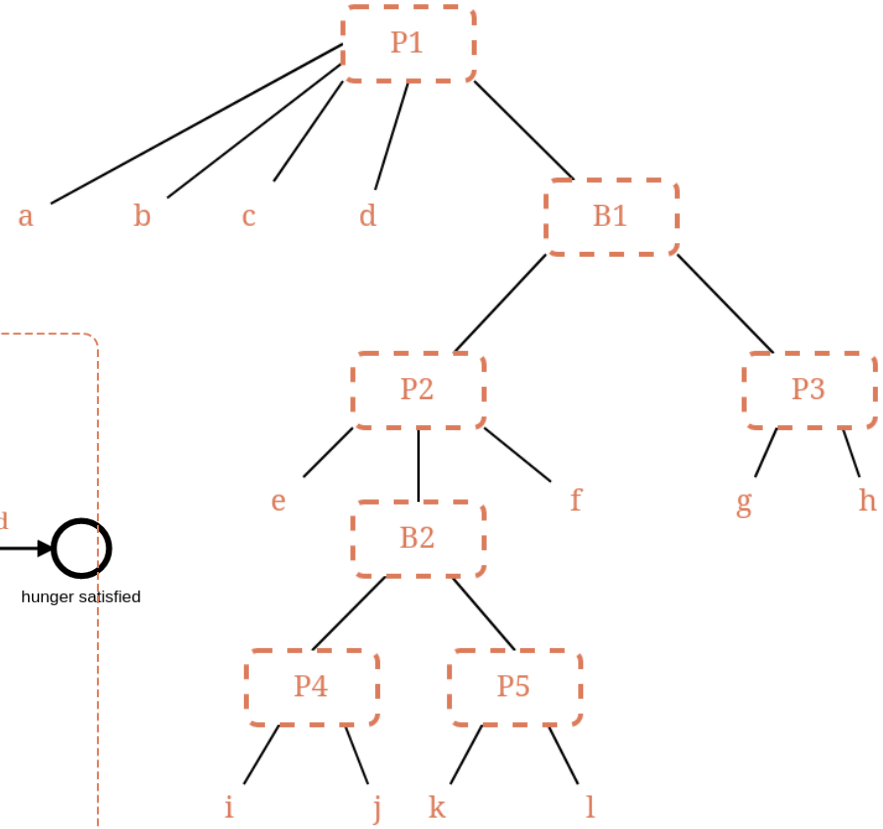
- Resultat

```
Manager sends the request, waits for a response and closes the request.
```

JBPT: RPST

- Fragments d'un RPST
- Tipus de fragments: Poligons, enllaços i rígids





ANÀLISI DELS RESULTATS

21
Models tractats

9
Tots els elements

12
Segueixen l'ordre

8
S'entén

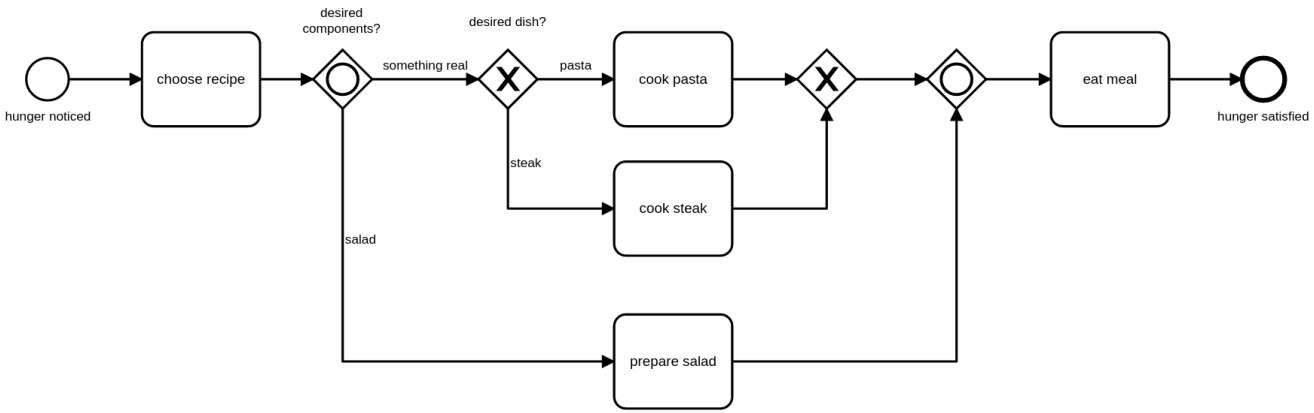
5
Satisfactori

12
Acceptable

4
No satisfactori

RESULTAT SATISFACTORI

- Cook.1



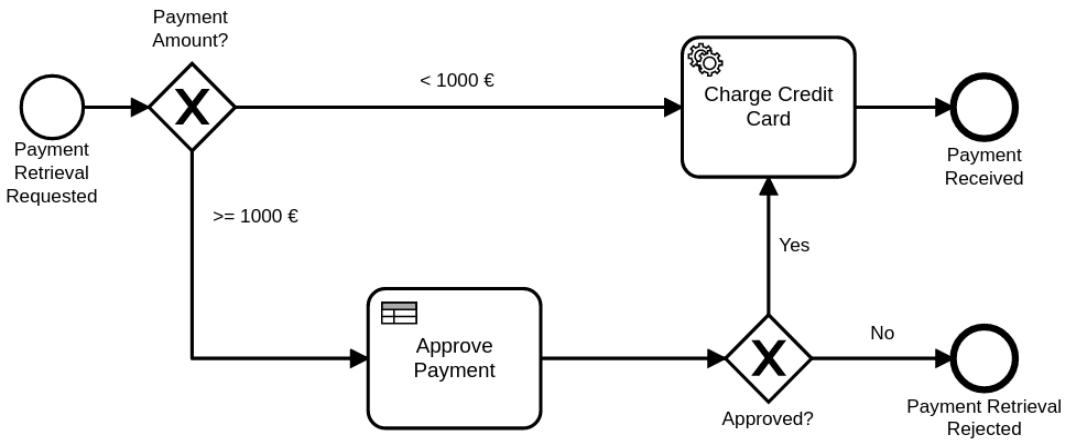
Once the noticed is hungered, the recipe is chosen then the condition desired components is checked. If the answer is salad then the salad is prepared.

If the answer is something real then the condition desired dish is checked if the answer is pasta then the pasta is cooked

if the answer is steak then the steak is cooked, the meal is eaten then the satisfied is hungered.

RESULTAT ACCEPTABLE

- Payment.1

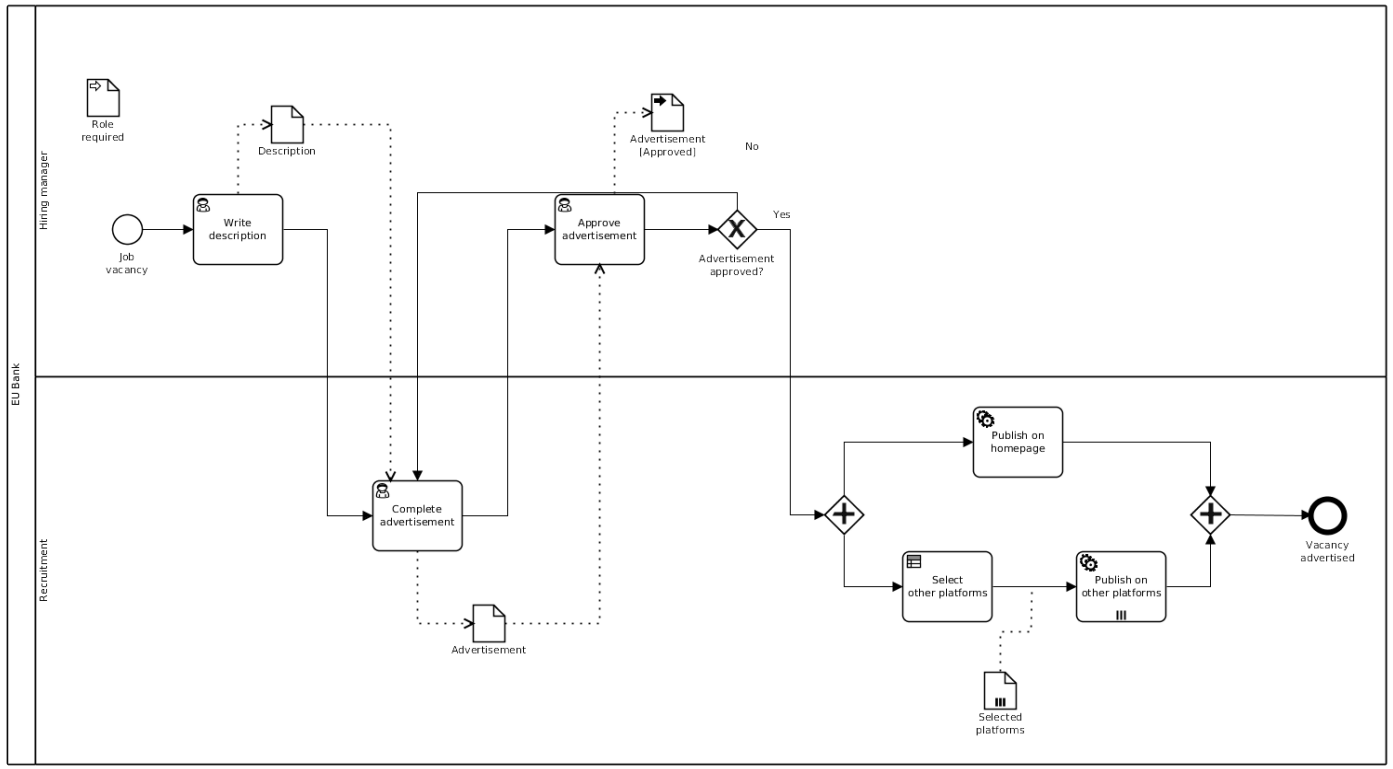


Once payment retrieval requested then the condition payment amount is checked. If the answer is >= 1000 € then the payment is approved then the condition approved is checked.

If the answer is < 1000 € then the credit card is charged.

RESULTAT NO SATISFACTORI

- C.7.0.1



Once hiring manager jobs the vacancy, hiring manager writes the description, recruitment completes the advertisement then hiring manager approves the advertisement then the condition advertisement approved is checked then recruitment completes the advertisement. If the answer is null then recruitment publishes on homepage.

If the answer is null then recruitment selects the other platforms then recruitment publishes on other platforms then vacancy advertised.

TREBALL FUTUR

- Tractar els rígids
- Aconseguir resultats més naturals
- Crear model de *Deep Learning*

CONCLUSIONS

Gestió del temps

Coneixements adquirits

Aportacions d'aquest treball

GRÀCIES

GUILLEM PLA BERTRAN