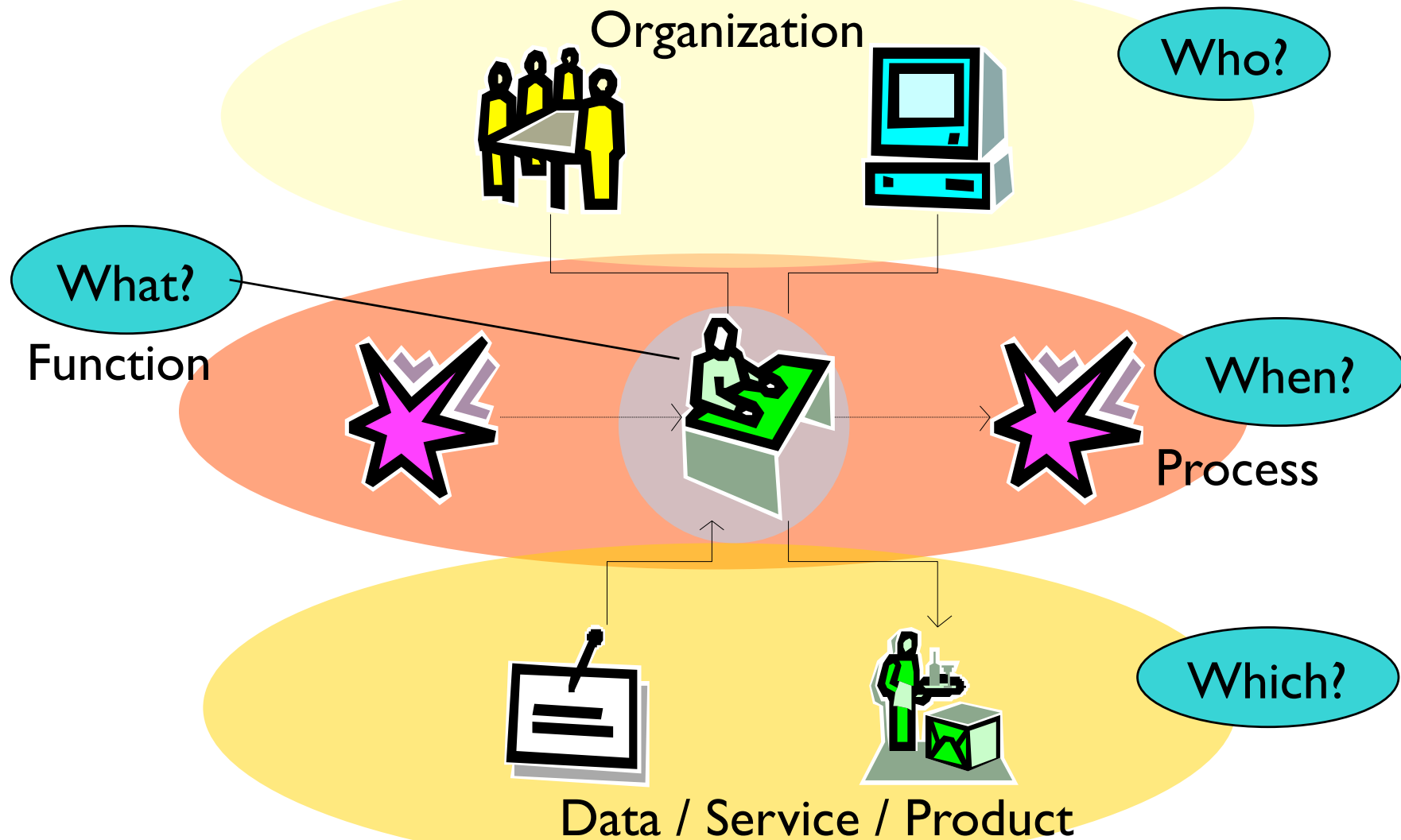


Business Process Modeling



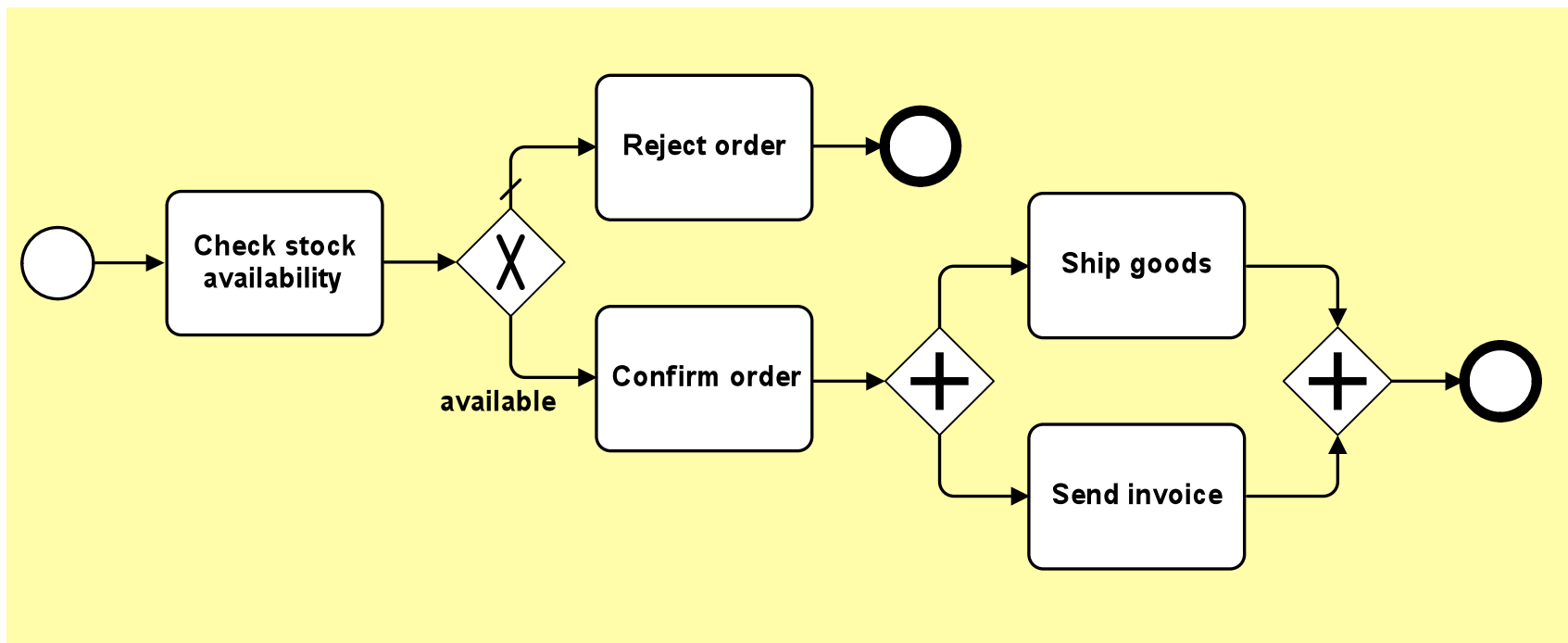
BPMN

- ▶ **Stands for “Business Process Management Notation”**
 - ▶ Graphical notation for specifying Business Processes
 - ▶ Developed by the Business Process Initiative (BPMI)
 - ▶ Now part of the OMG set of standards

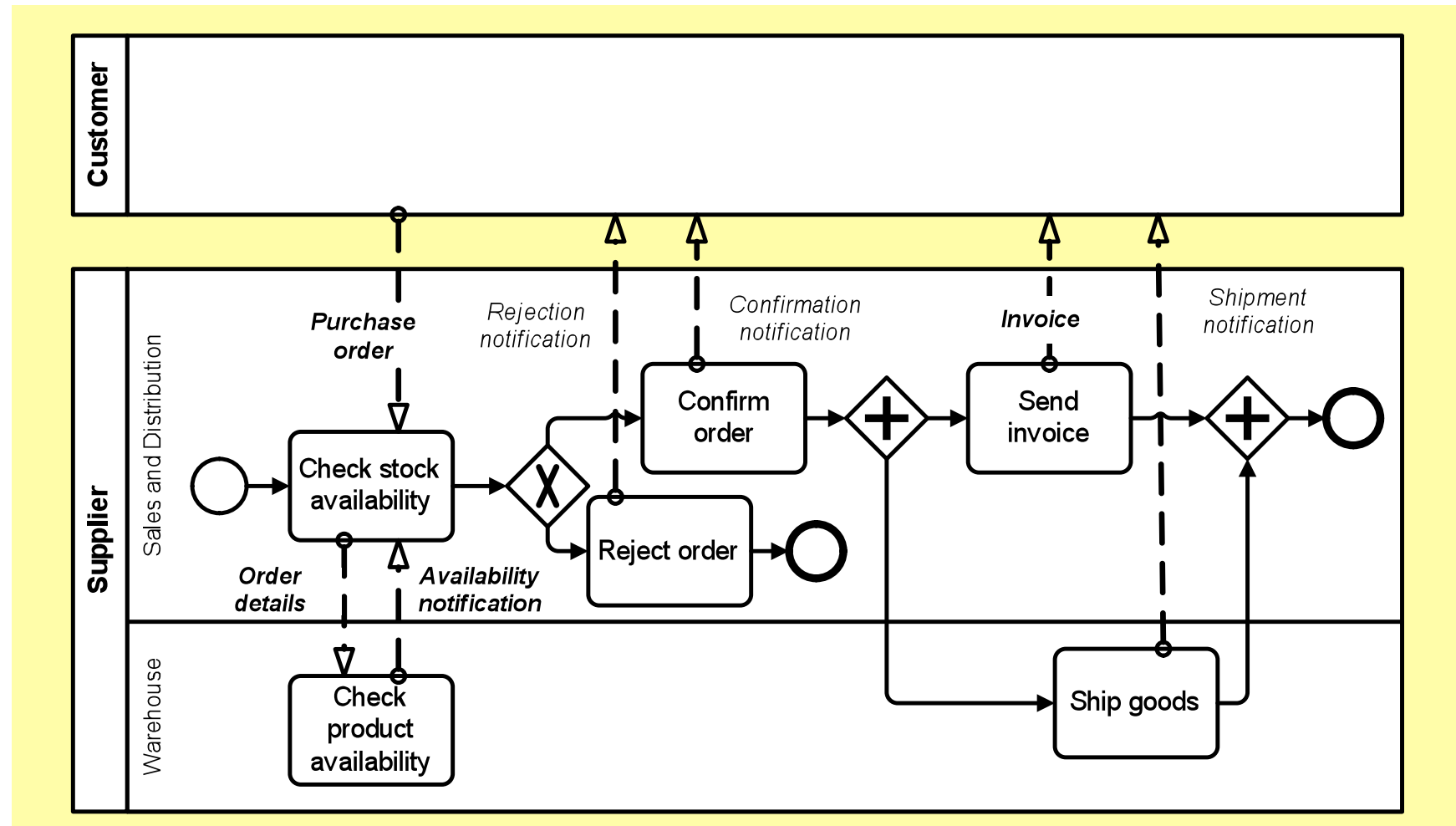
- ▶ **History**
 - ▶ BPMN 1.0, by BPMI (May 2004)
 - ▶ BPMN 1.0, OMG Final Adopted Specification (Feb 2006)
 - ▶ BPMN 1.1, OMG Specification (Feb 2008)
 - ▶ BPMN 1.2, OMG Specification (Jan 2009)

- ➡ The last revised draft of the BPMN 2.0 has recently been released

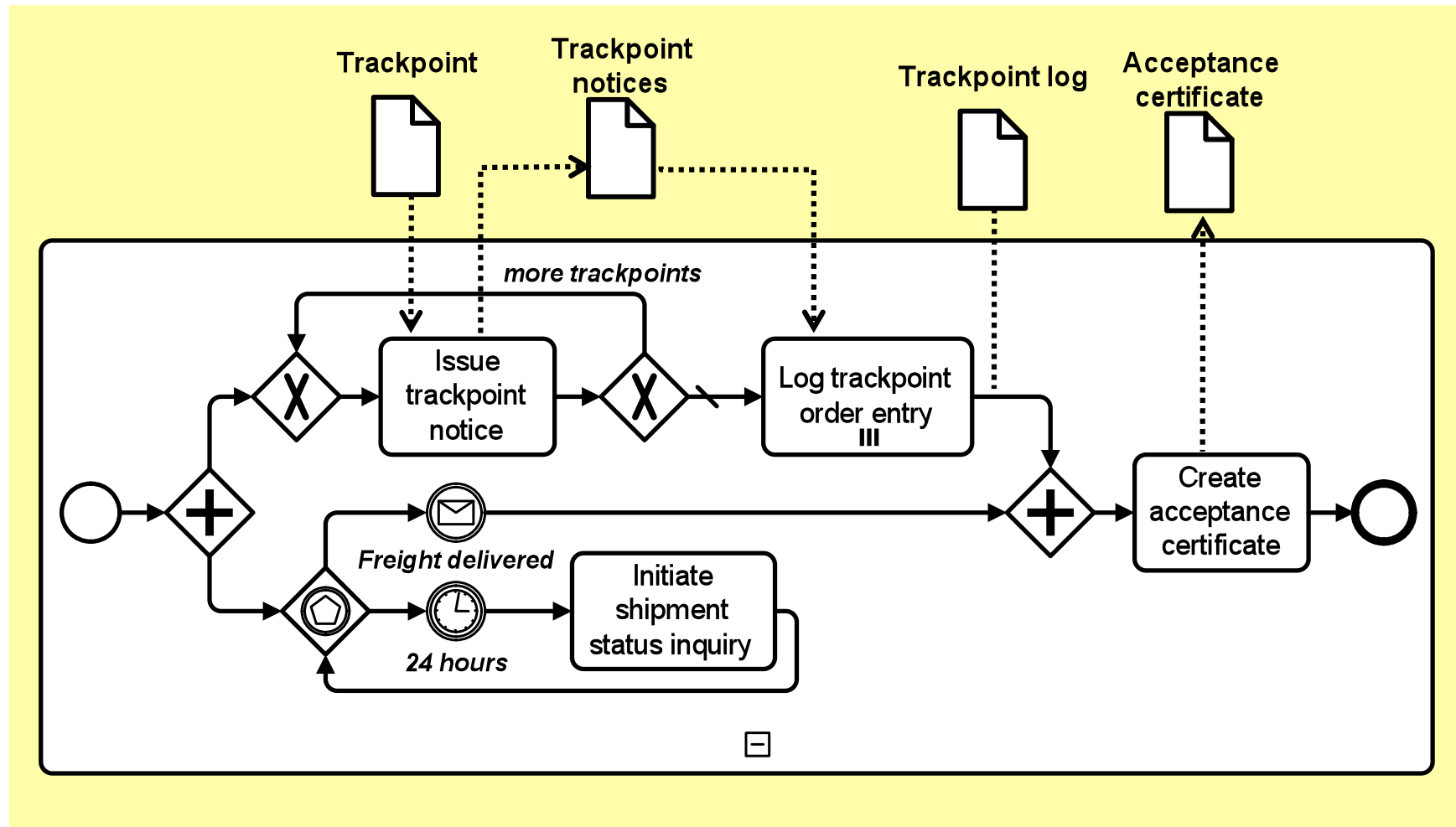
A simple business process



Organizational perspective (resource mgt)



Data Modeling Perspective



Simulation of BPMN models

- ▶ **Simulation on the BPM landscape**
 - ▶ General purpose simulation platforms (e.g. Arena)
 - ▶ BPM specific platforms
 - ▶ Commercial: Tibco business Studio, ITP Commerce, IBM Websphere Business Modeler, ARIS, Protos
 - ▶ Academic: e.g. work at Eindhoven University of Technology (Netherlands), work at the Queensland University of Technology (Australia)

- ▶ **We aim at**
 - ▶ Covering of a larger subset of BPMN
 - ▶ Providing an open simulation engine
 - ▶ Tool independence
 - ▶ Extensibility and customization

Agenda

- ▶ **Context**
- ▶ **BPMN**
 - ▶ Basics on modeling with BPMN
 - ▶ Mapping BPMN to plain Petri nets
- ▶ **Simulation of BPMN with CPN tools**
 - ▶ Simulation information
 - ▶ Mapping of control flow constructs
 - ▶ Mapping of resource management
- ▶ **Prototype**
- ▶ **Outlook**

BPMN notation (a subset)

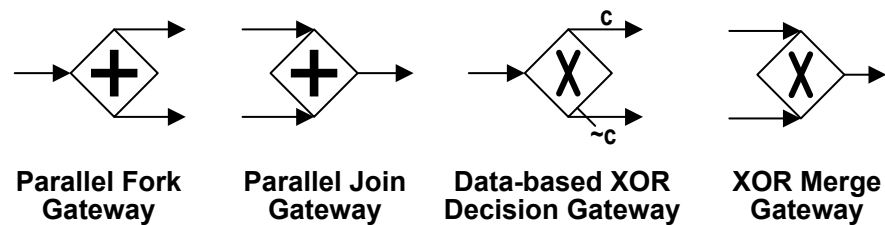
Events



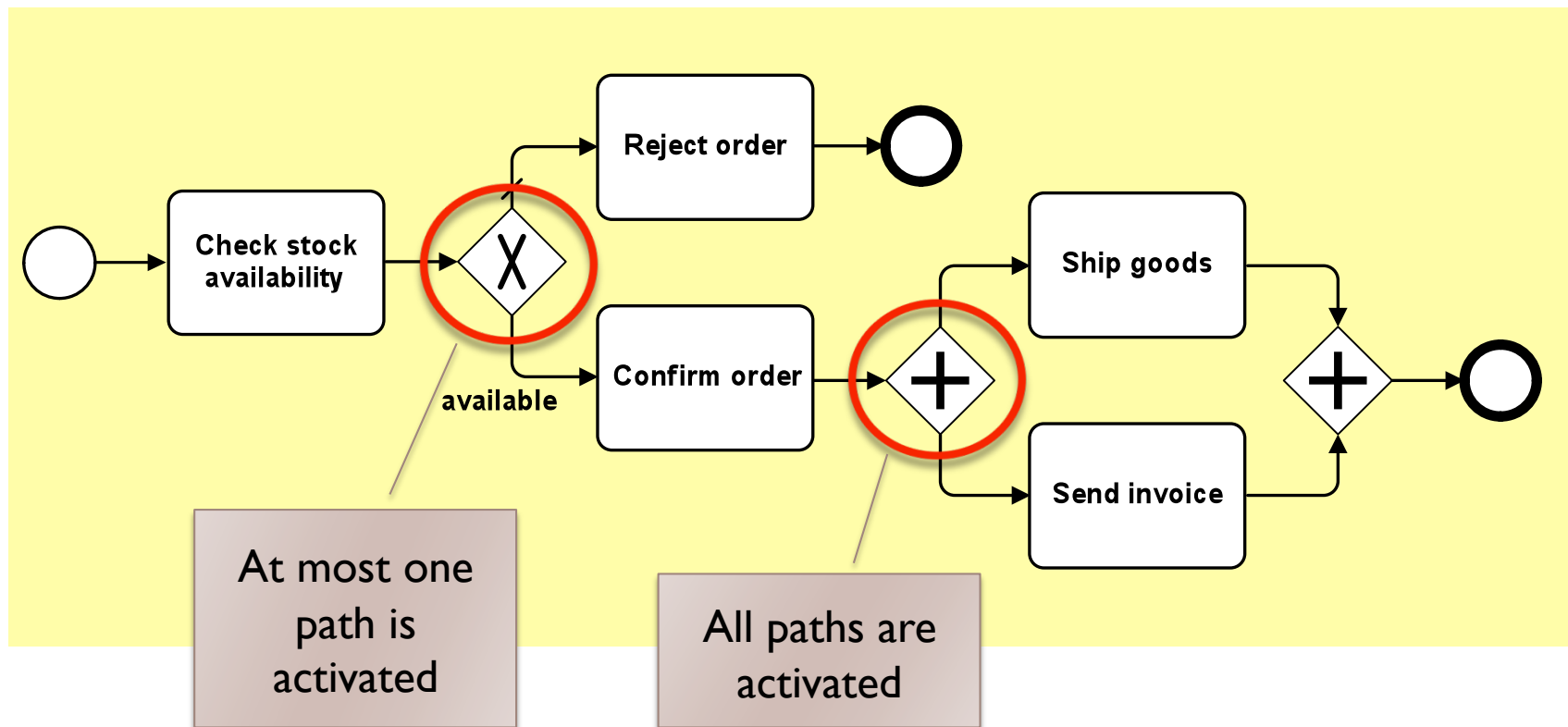
Activities



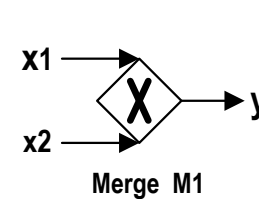
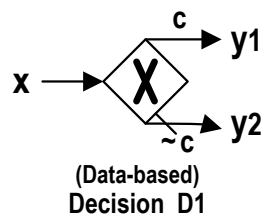
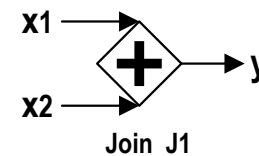
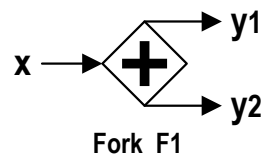
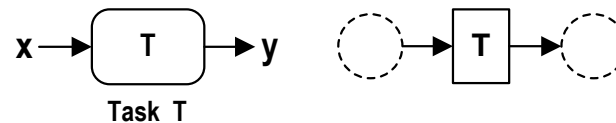
Gateways



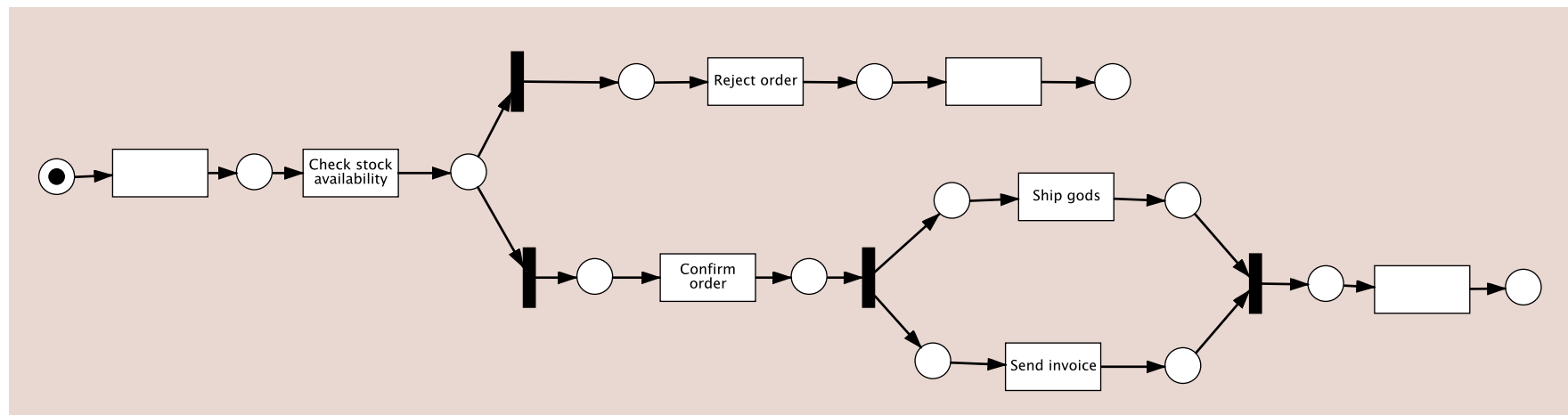
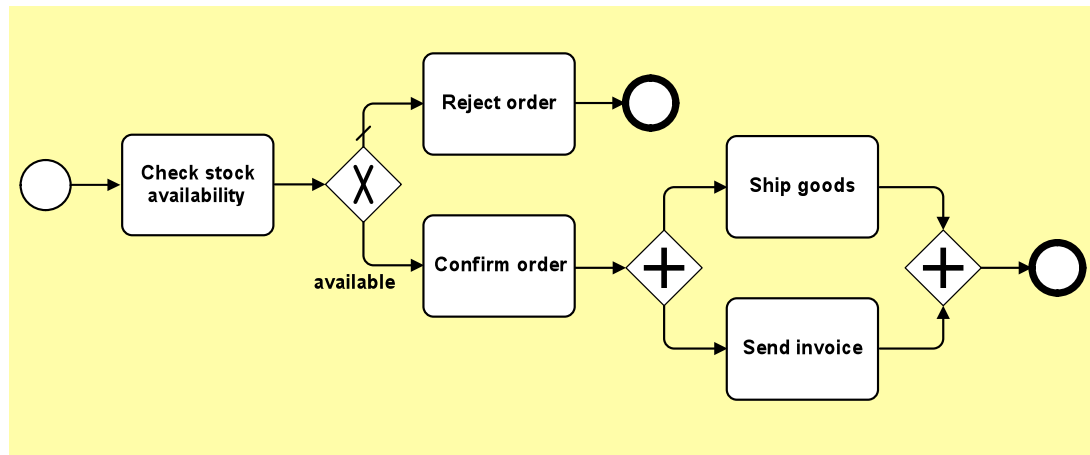
Order handling example



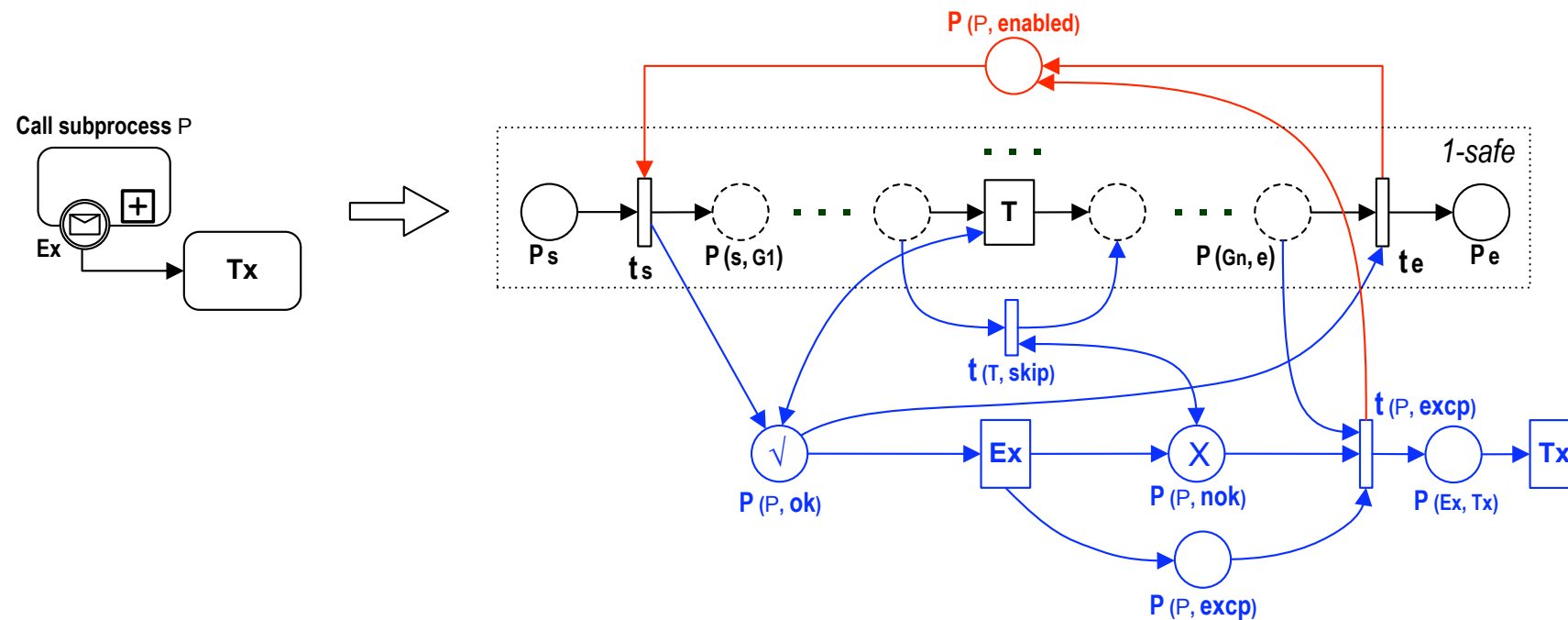
Mapping BPMN to plain Petri nets



Mapping ...



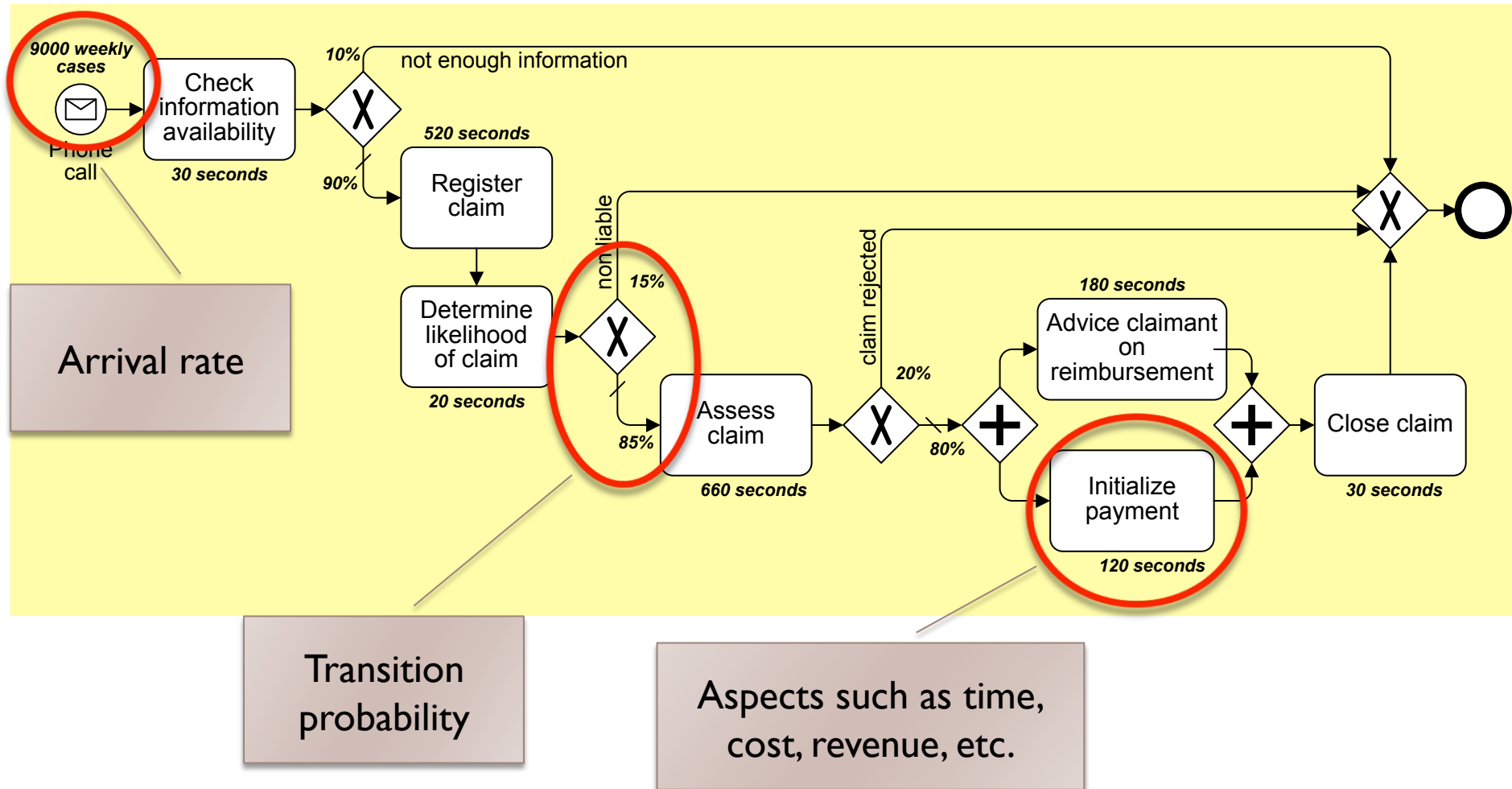
Advanced constructs



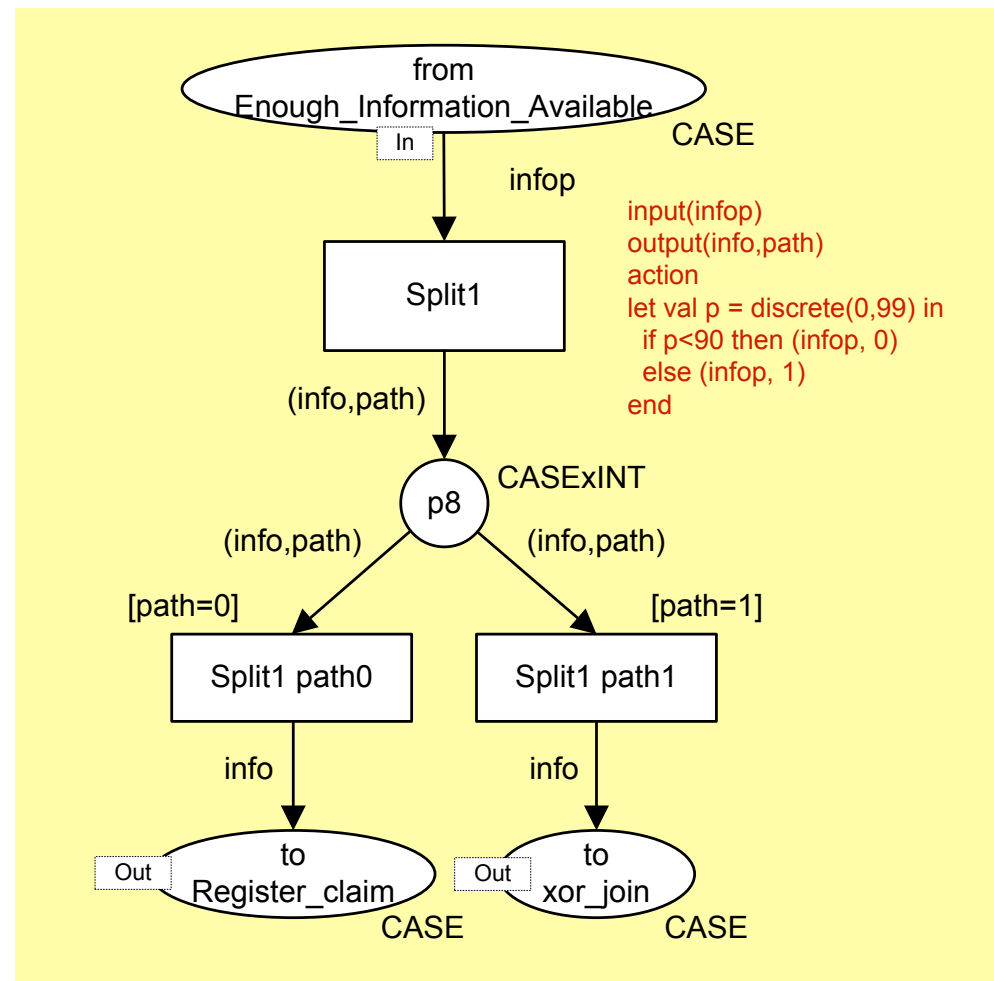
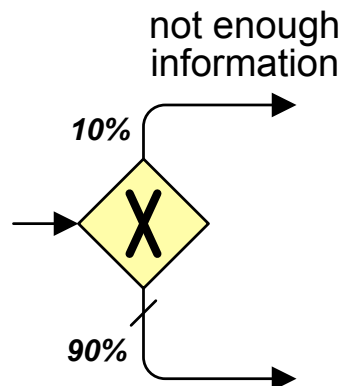
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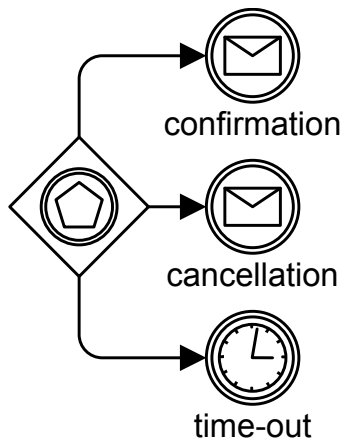
Simulation information



Mapping to CPN

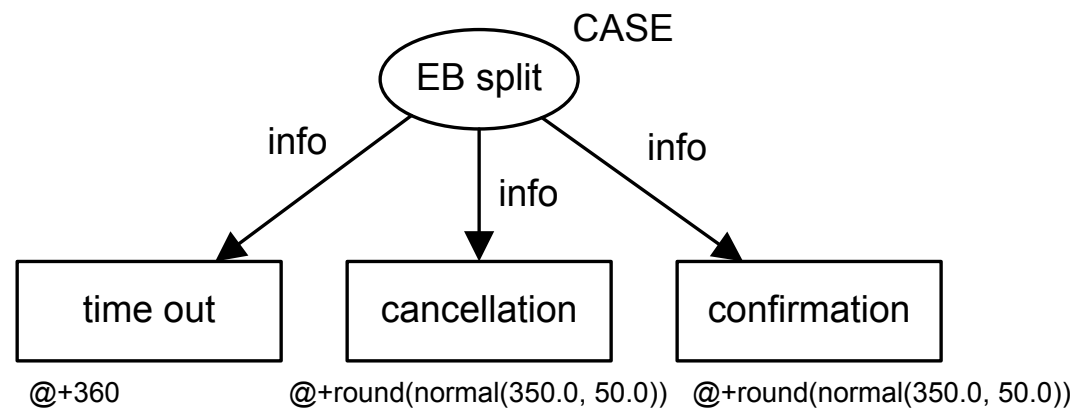


Mapping to CPN

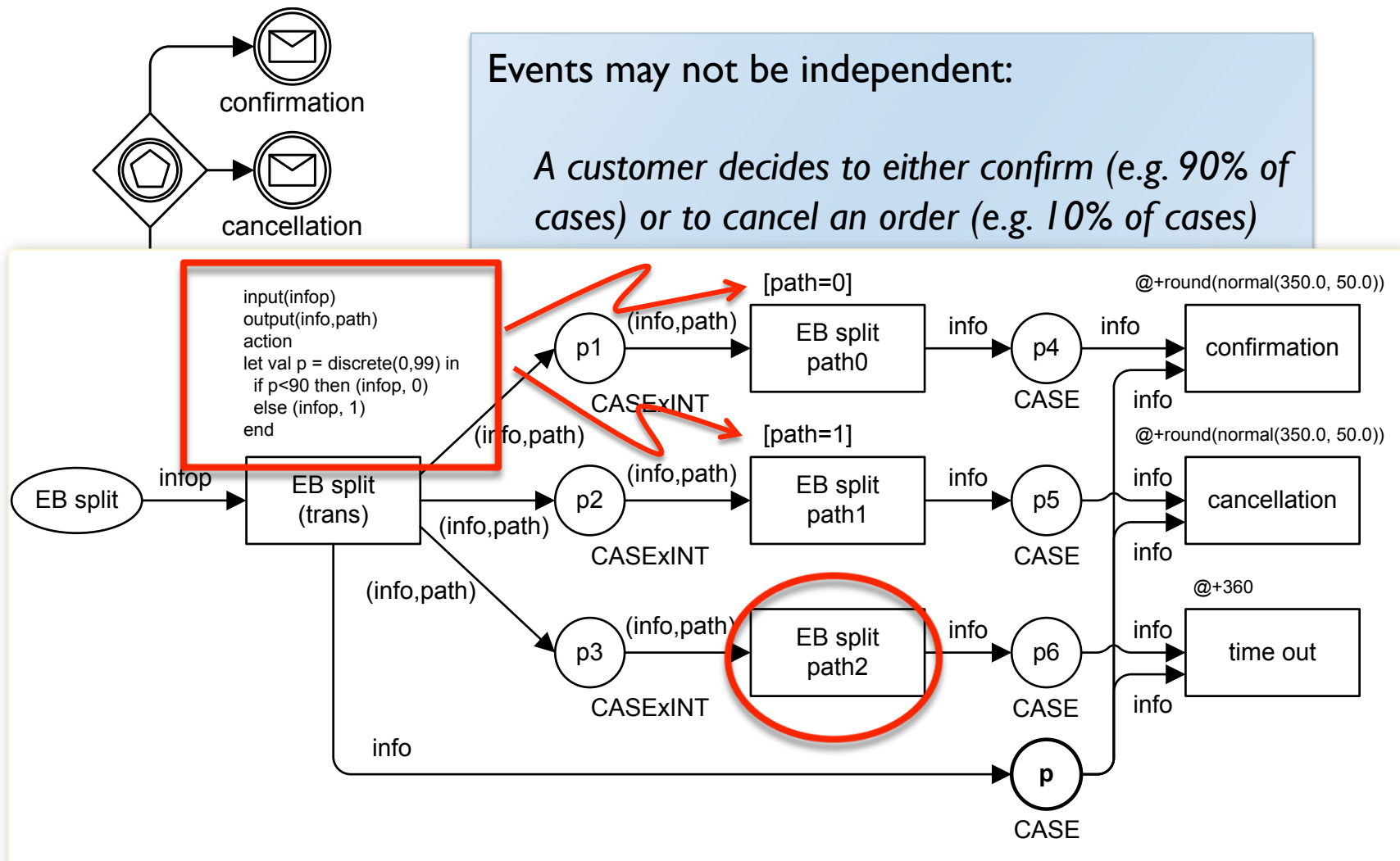


Event-driven XOR gateways

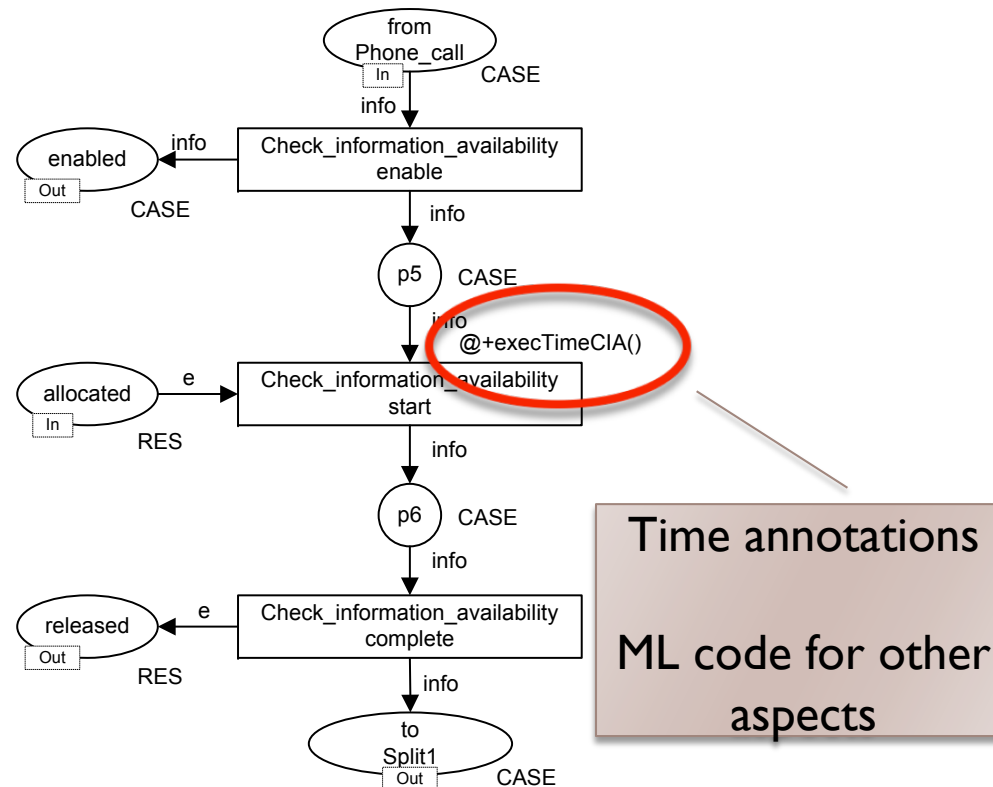
- The process stops and waits for an event to occur
- It resumes and follows a single branch depending on what event occurred



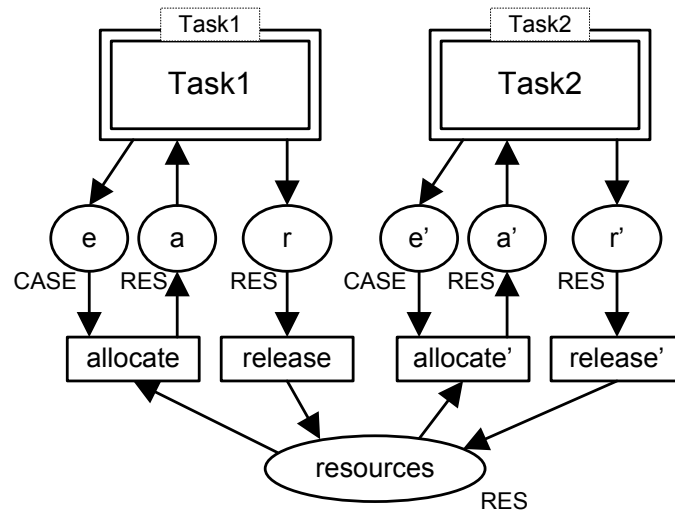
Mapping to CPN



Adding time, cost, and other simulation properties

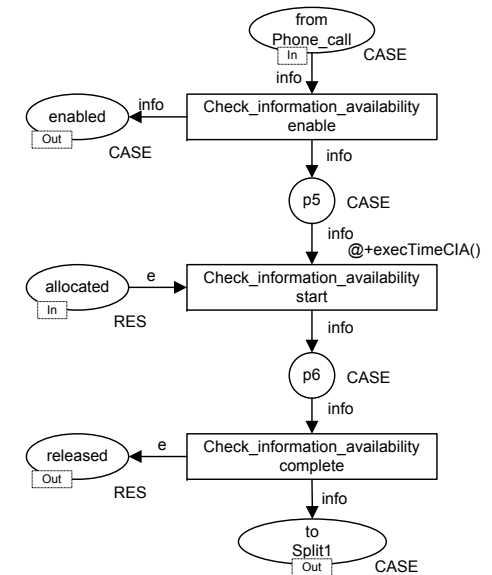
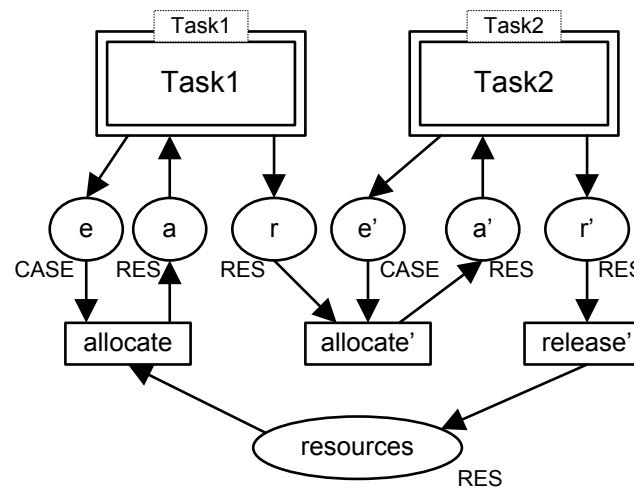


Resource management



A resource is allocated for performing a single task

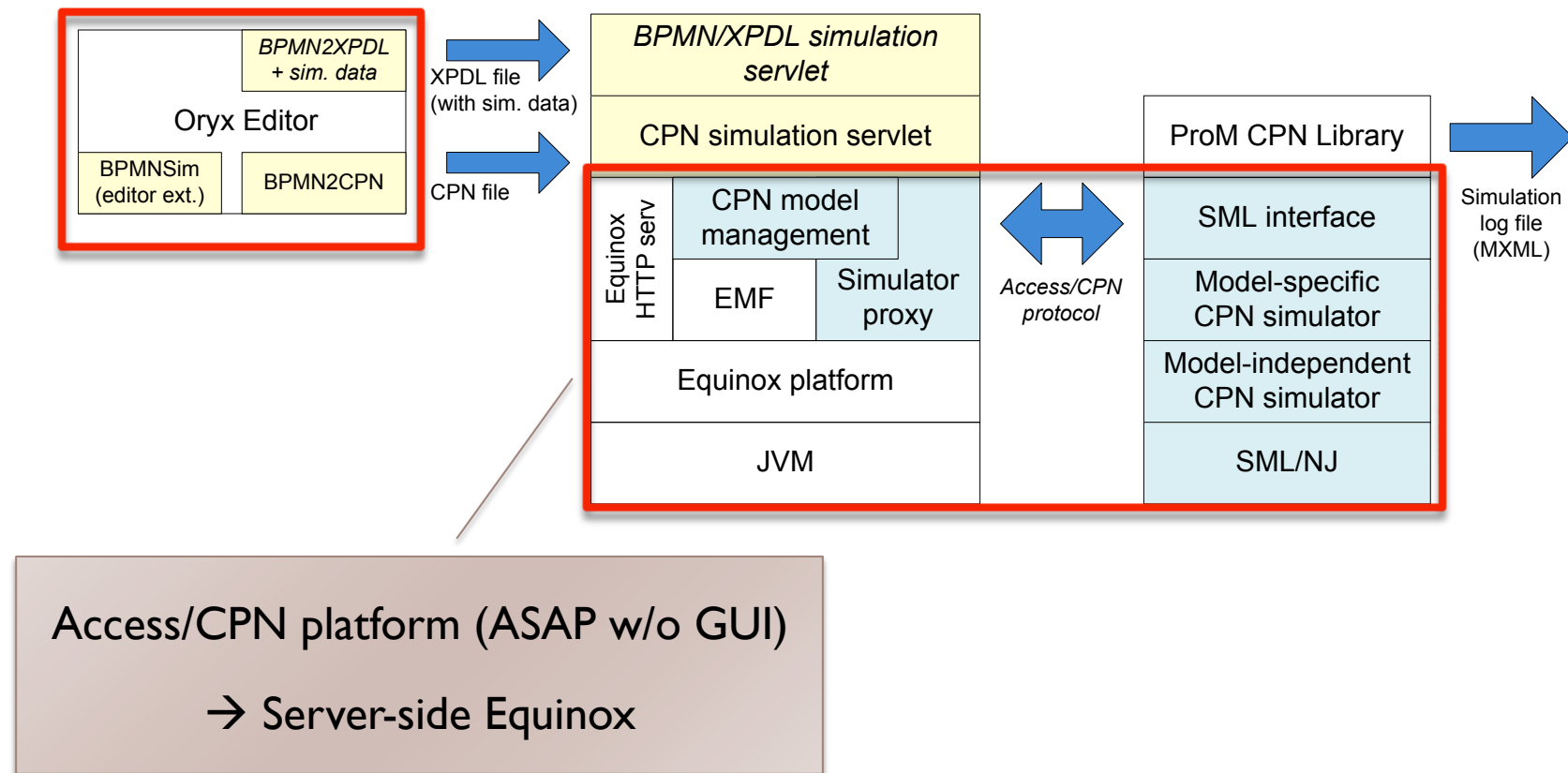
The resource is retained as long as it can perform a sequence tasks



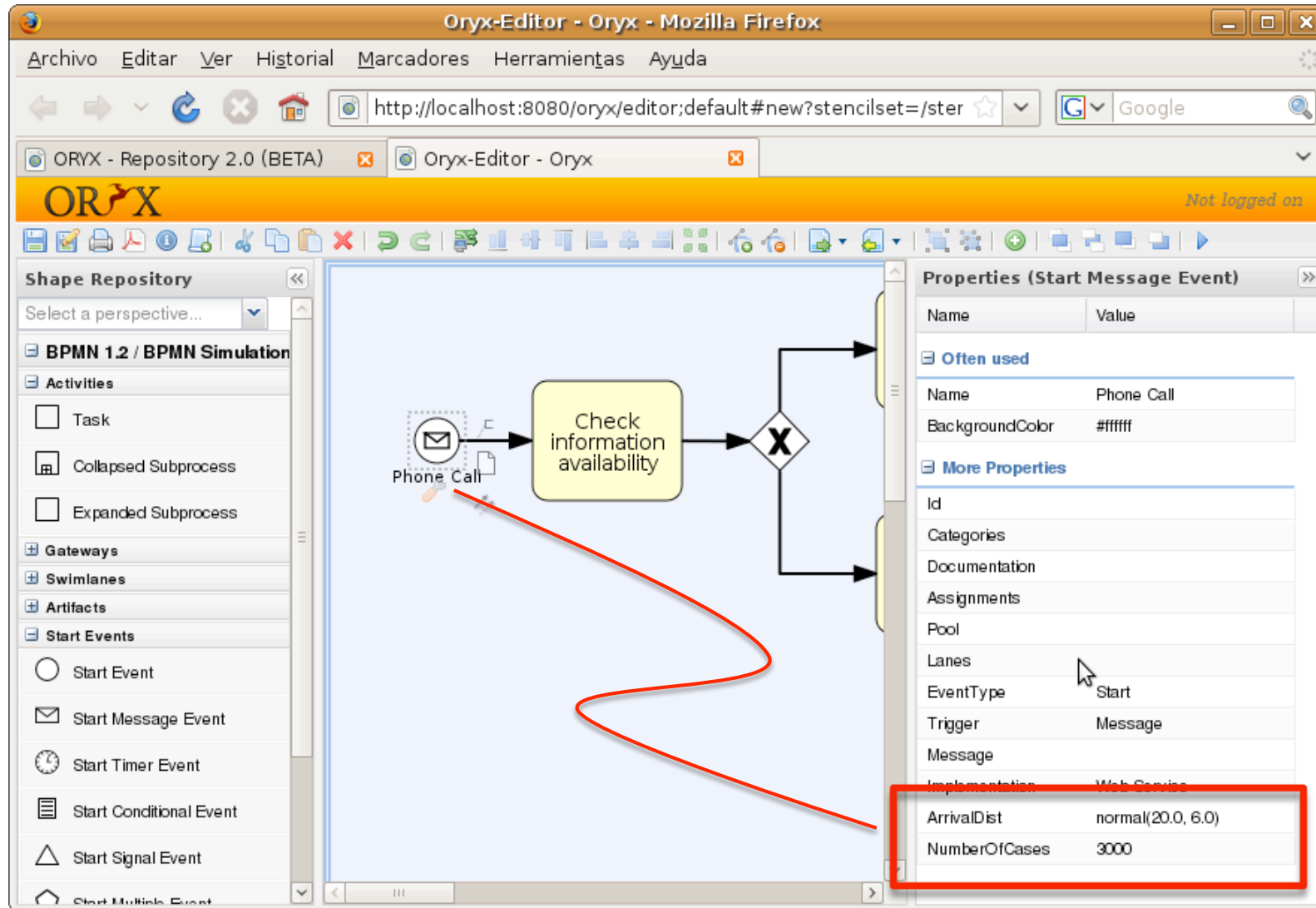
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Architecture



Oryx editor



Oryx-Editor - Oryx - Mozilla Firefox

Archivo Editor Ver Historial Marcadores Herramientas Ayuda

http://localhost:8080/oryx/editor/default#new?stencilset=/ster

ORYX - Repository 2.0 (BETA) Oryx-Editor - Oryx

Not logged on

Shape Repository

Select a perspective...

BPMN 1.2 / BPMN Simulation

Activities

- ☐ Task
- ☐ Collapsed Subprocess
- ☐ Expanded Subprocess

Gateways

Swimlanes

Artifacts

Start Events

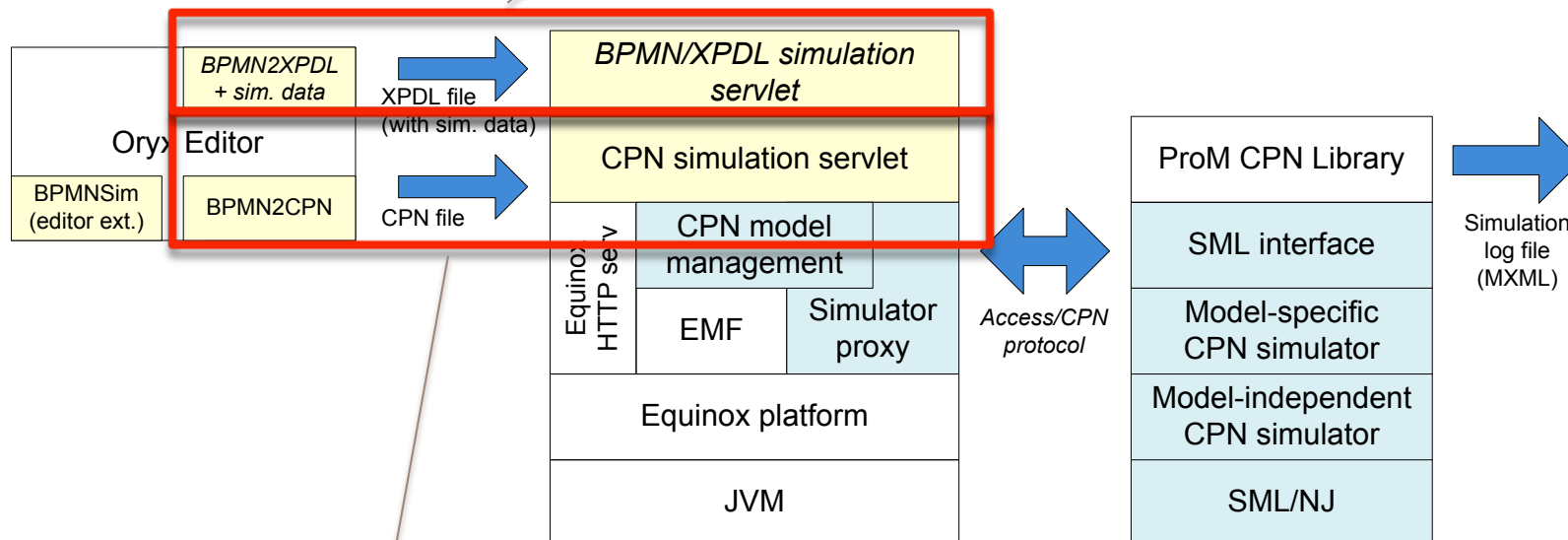
- ☐ Start Event
- ☒ Start Message Event
- ☐ Start Timer Event
- ☐ Start Conditional Event
- ☐ Start Signal Event
- ☐ Start Multiple Event

Properties (Start Message Event)

Name	Value
Often used	
Name	Phone Call
BackgroundColor	#ffffff
More Properties	
Id	
Categories	
Documentation	
Assignments	
Pool	
Lanes	
EventType	Start
Trigger	Message
Message	
Implementation	Web Service
ArrivalDist	normal(20.0, 6.0)
NumberOfCases	3000

Architecture

We are decoupling the BPMN to CPN translator to achieve tool independence

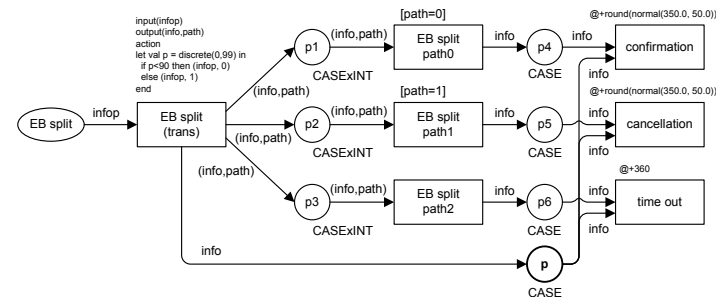
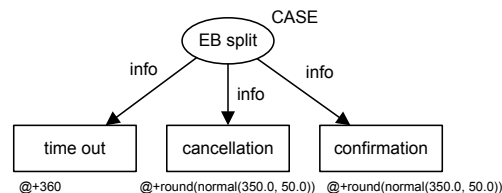


Currently, BPMN models are translated to CP nets (the translator is embeded in Oryx).

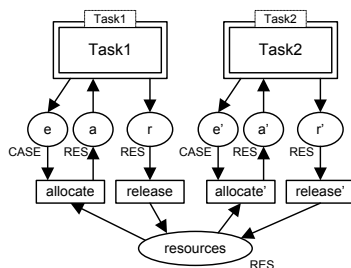
The CPN file is posted to the simulation servlet.

What about flexibility ?

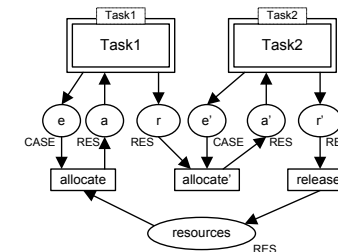
- ▶ There may have been several alternative ways to model a single BPMN construct
 - ▶ It depends on the amount of information and the approach to simulation



- ▶ Why not to provide a set of simulation profiles?



Workflow
resource patterns



- ▶ Our approach, generation of CP nets using templates
 - ▶ Currently, based on inheritance, but we want to explore some other approaches (e.g. model transformation, AOP)

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Outlook

- ▶ **A first running prototype**
 - ▶ Covers a subset of BPMN constructs
 - ▶ Embedded inside Oryx Editor
 - ▶ Benefits of the Access/CPN interface/architecture

- ▶ **Ongoing work**
 - ▶ Extend the BPMN coverage
 - ▶ Colors can be used to model advanced BPMN constructs
 - ▶ Move to a standard serialization format for BPMN
 - ▶ XPDL or BPMN 2.0
 - ▶ Characterizing design space for templates
 - ▶ Simulation and Performance analysis
 - ▶ Real logging information for simulating the process based on past execution and current state
 - ▶ Key performance analysis (e.g. using ProM plugins)
 - ▶ Validation on the logistics domain