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Abstract

In our proposed work, we propose an anomaly detection framework, for detecting anomalous transactions in business processes from transaction event logs. Such a framework will help enhance the accuracy of anomaly detection in the global Supply Chain, improve the multi-level business processes workflow in the Supply Chain domain, and will optimize the processes in the Supply Chain in terms of security and automation. In the proposed work Ontology is utilized to provide anomaly classification in business transactions, based on crafted SWRL rules for that purpose. Our work has been evaluated based on logs generated from simulating a generic business process model related to a procurement scenario, and the findings show that our framework can detect and classify anomalous transactions from those logs.

Steps of the Proposed Approach

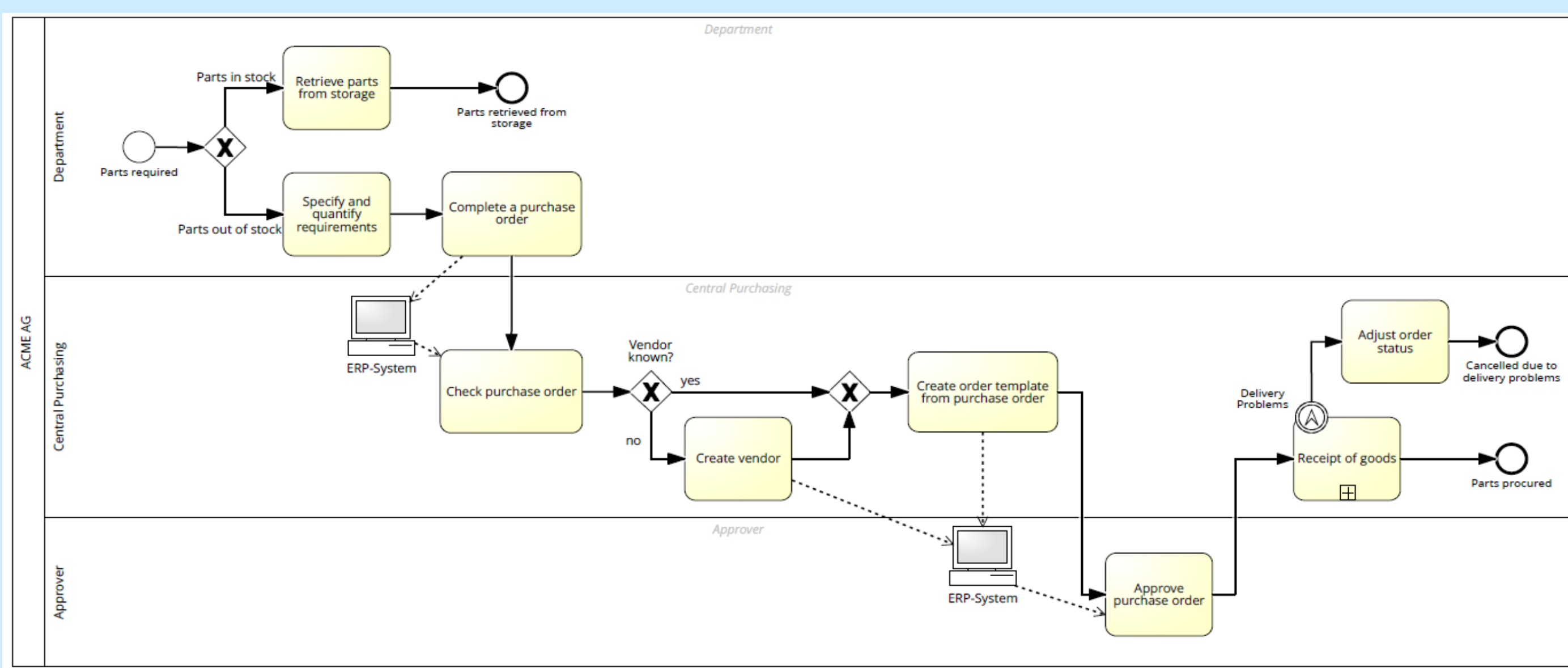
Our approach is composed of three steps:

Convert BPMN Model into an Ontology

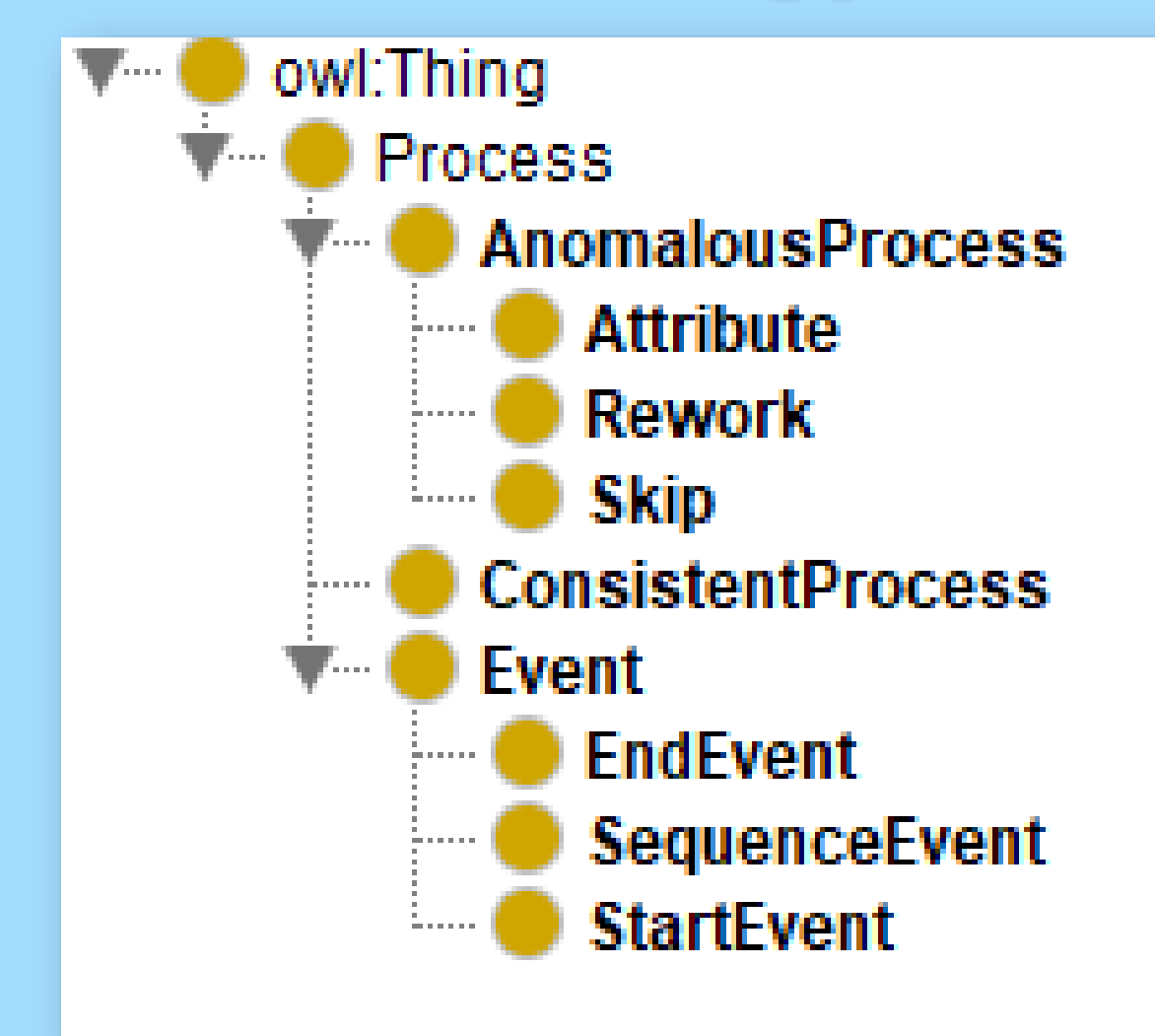
Simulate Business Process and Generate Event Log

Build SWRL Rules for Anomaly Classification

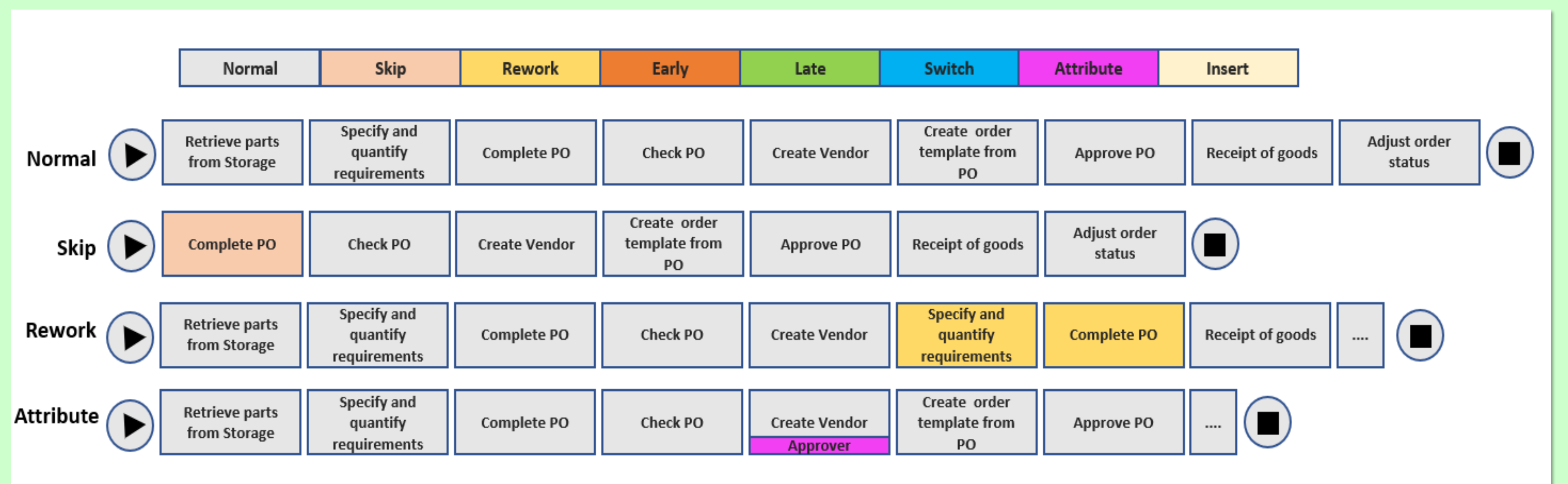
Example Procurement Business Process



Class Hierarchy of the Procurement Ontology



Types of Anomalies to Detect and Classify



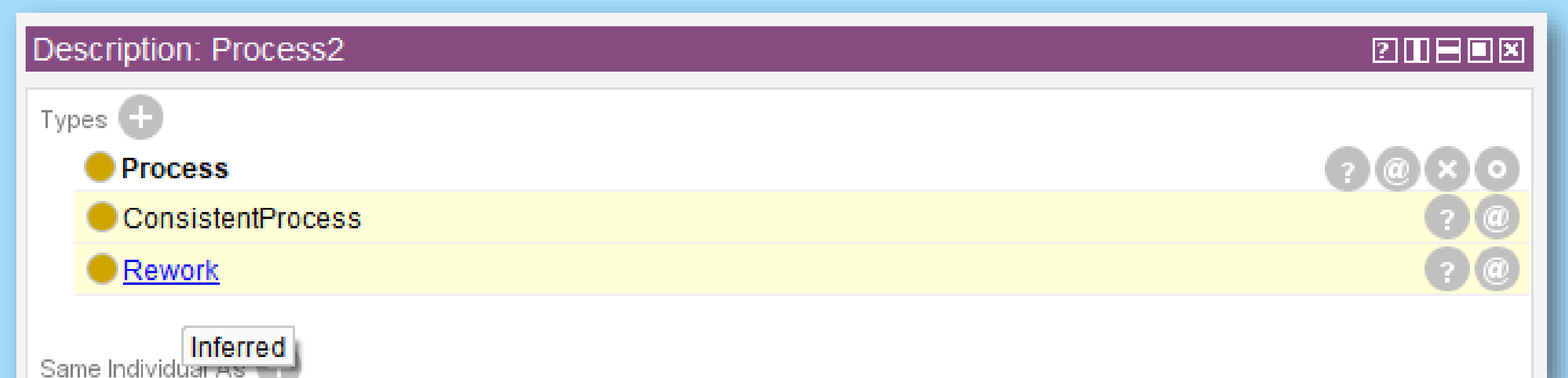
Classifying a Process with Reworked Event

This table summarizes the Business Process "Process2" individual, asserted with the following data and object properties among its events. Process2' is classified as a Rework Process, because the event 'P2_Specify Quantify Requirements' was executed twice.

Individual Name	Property	Value	Class
Process2	beginsWith	P2_PartsRequired	'Start Event'
	endsWith	P2_PartsProcured	'End Event'
P2_PartsRequired	followedBy	P2_Specify Quantity Req.	'Sequence' Event
P2_Specify Quantity Requirements	followedBy	P2_Specify Quantity Req.	'End Event'

Below is an asserted SWRL rule used to classify Process2 as a "Rework Process":

$Process(?P), StartEvent(?ST), beginsWith(?P, ?ST), followedBy(?ST, ?S), followedBy(?S, ?S), EndEvent(?EE), endsWith(?P, ?EE) \rightarrow Rework(?P)$



Future Work

As a future work we aim at extending the ontology to be able to classify another type of anomalies such as:
Early: An event was executed too early,
Late: An event was executed too late.
Insert: A random event was inserted to the workflow, and
Switch: Two events swapped their order of execution.

Acknowledgment

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References

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