RESEARCHING THE STRUCTURAL COMPLEXITY OF BPMN MODELS BASED ON EVENT ANALYSIS

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The BPMN (Business Process Model and Notation) modelling notation provides a set of graphical elements used to depict the structure and behavior of business processes. In BPMN models, events play a crucial role in determining the complexity of the business process structure. As the number and variety of events increases, the complexity of the model increases, making it difficult to analyze, optimize, and predict the behavior of the business process.

Therefore, analyzing events in BPMN models is critical to understanding and reducing the structural complexity of business processes, reducing the likelihood of errors and increasing the efficiency of models.

Hence, in this study it is necessary to address the following research questions:

RQ1: How to identify business process events in BPMN models?

RQ2: How to analyze the structural complexity of BPMN models based on event analysis?

The research object is the process of analyzing the structural complexity of BPMN models based on event analysis. The research subject is a software component for analyzing the structural complexity of BPMN models based on event analysis.

The study aims to reduce the number of errors in business process models by formulating recommendations on the structural complexity of BPMN models based on event analysis. To assess the structural complexity of BPMN models by evaluating the degree of connections between elements, the Coefficient of Network Connectivity (CNC) measure is used:

$$CNC = \frac{|A|}{|N|},$$

where A is the set of sequence flows (i.e. arcs), N is the set of elements (i.e. nodes).

The detection of the CNC thresholds for analyzing the structural complexity of BPMN models (Table 1) is performed using a large set of 3729 BPMN models [1].

Table 1 – Threshold values for the BPMN CNC measure

BPMN model efficiency thresholds	Very low	Fairly low	Fairly high	Very high
CNC	≤ 0.78	> 0.78	> 0.91	> 1.00

Predicting the CNC values based on BPMN events using regression analysis is a promising approach, which is expected to offer a reliable technique for classifying BPMN models by performance levels and formulating recommendations for reducing structural errors and shortcomings.

References:

1. BPMN for research, https://github.com/camunda/bpmn-for-research, 20.04.2025.