

**Kopp Andrii, Lubenets Vladyslav, Matviienko Andrii, Pasichnyi Oleksandr**  
*National Technical University  
 «Kharkiv Polytechnic Institute», Kharkiv*

In this paper, we study the gateway mismatch (MM) [1, 2] of business process models, created during BPMN (Business Process Model and Notation) training done by Master's Students studying "Information Systems Strategy" in the "Information Systems Software" program. Gateways mismatch metric reflects the maintainability and structuredness of business process models. In the well-structured process model each split gateway has corresponding join gateway of the same type [1, 2]. MM is one of the maintainability metrics [1, 2], which defines how hard it is to use such a BPMN model:

$$MM = \sum_{g \in \{and, or, xor\}} \left| \sum_{s \in S_g} d(s) - \sum_{s \in J_g} d(s) \right|,$$

where  $s \in S_g$  is the split gateway of type  $g \in \{and, or, xor\}$ ;  $s \in J_g$  is the join gateway of type  $g \in \{and, or, xor\}$ ;  $d(s)$  is the number of flows connected to the gateway.

We analyzed 132 BPMN models, among which 25% have MM equal to 0, 50% have MM between 0 and 5, and the rest 25% have MM above 5. The highest MM is 39, the mean MM is 4.13, while the lowest MM is 0 (see Fig. 1a). The significant correlation is found between MM and invalid tasks – 0.83 (see Fig. 1b), which lets us suggest that high MM negatively affects BPMN process model quality.

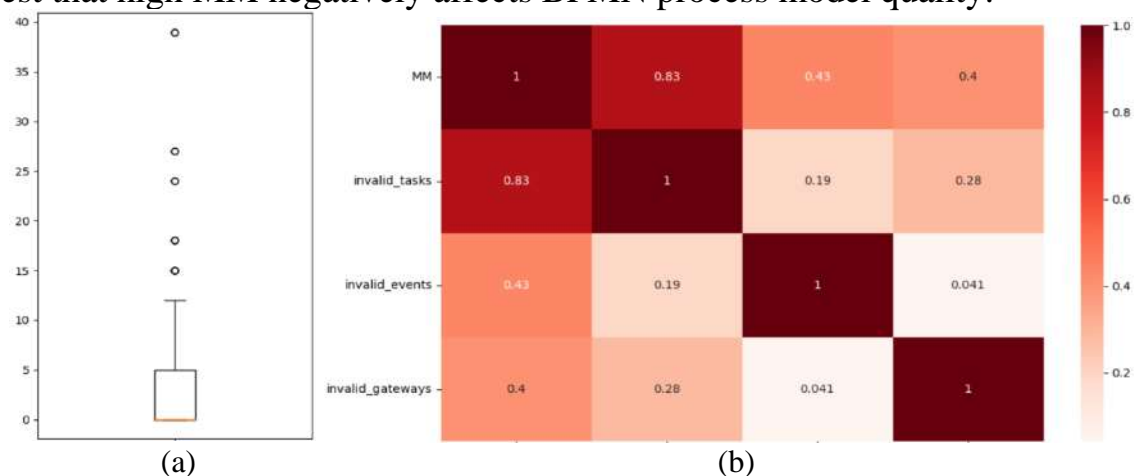


Fig. 1. – MM box-plot (a); MM and invalid BPMN elements correlation heatmap (b)

**References:**

1. Orlovskiy D., Kopp A. An Approach to Business Process Model Structuredness Analysis: Errors Detection and Cost-Saving Estimation. *Communications in Computer and Information Science*. 2022. Vol. 1635. P. 23–39.
2. Orlovskiy D., Kopp A. An Information Technology for Detection and Fixing Effort Estimation of Business Process Model Structuredness Errors. *Communications in Computer and Information Science*. 2022. Vol. 1698. P. 127–152.