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Airports are highly complex elements of the air transport network. The complexity of service processes and units involved in the air transport projects requires the uninterrupted exchange of diverse operational data, which is increasingly supported by latest developments in airport systems such as the concept of Airport Collaborative Decision Making i.e. A-CDM. The correctness of data exchange between air traffic services units depends, among others, on the punctuality of flights.

The first part of the doctoral dissertation, consisting of the analysis of the research problem, literature review and preliminary research conclusions, (problem identification in A-CDM, questionnaire, field measurements) the author proved systems of this kind to be prone to interference as well as, human and technical errors, the occurrence of which may result in the loss of the principal function of A-CDM.

As a result, a research hypothesis was formulated that it is possible to create a description of the A-CDM system structure elements using the Petri nets as a modeling tool for information exchange within the airport area, in order to analyze and evaluate the effectiveness of the data exchange process at the airport for the selected system configuration.

In the second part of the doctoral dissertation the author puts forward a method for assessing the data exchange process at the airport with the use of a detailed information exchange model under A-CDM, taking into account the real-time airport traffic, key ground handling processes carried out at the airport and the coordination of activities of system users. The developed model made identified areas in the structure of the A-CDM data exchange system that are highly-sensitive to irregularities. Experiments have shown that the most severe operational effects occur with operational information errors in the ground handling and departure phases. Based on the evaluation of the obtained results, the author formulated guidelines for the improvement of airport data exchange systems.