AN OPEN SOURCE TOOL FOR AUTOMATED INPUT DATA IN SIMULATION

Barlas, P.; Heavey, C. & Dagkakis, G.
Enterprise Research Centre (ERC), University of Limerick, Limerick, Ireland
E-Mail: panagiotis.barlas@ul.ie, cathal.heavey@ul.ie, georgios.dagkakis@ul.ie

Abstract
Discrete Event Simulation (DES) is one of the most effective tools for planning, designing and improving material flows in production. One of the main weaknesses of operating DES is the exertion needed and costs spent on collecting and handling the input data from different organisation’s data resources. To tackle the problem of the time consuming input data process for DES projects an Open Source (OS) tool, called Knowledge Extraction (KE) tool was developed. The tool reads data from several organisations’ resources; analyses it and outputs it in a format that is applicable to be used by a simulation tool, all conducted in one automated process. The primary, readable to simulation software, output format follows the Core Manufacturing Simulation Data (CMSD). This paper presents the KE tool and a test implementation, as a first step towards the validation of the tool in a real case study in the medical industry.

Key Words: Input Data Management, Discrete Event Simulation, Open Source, Core Manufacturing Simulation Data, Automation

1. INTRODUCTION

Manufacturing systems, processes, and data are expanding and becoming more complicated. Product design, manufacturing engineering, and production management decisions include the consideration of various complex, co-dependent issues and variables that are too complicated for the human mind to deal with at one time. DES has proved itself to be an effective tool for complex processes analysis and it is argued that the input data procedure is the most critical and time-consuming phase in DES projects [1]. The time spent on the input data procedure is typically as much as 10-40 % of the total time of a DES project [2]. Major issues that lead to this extreme time consumption, relate to low quality data, difficulty in identifying available data sources and massive manual workload to transform raw data into simulation input [3, 4]. Skoogh and Johansson [5] stated that the extensive time consumption hindrance sometimes lures organisations to select less complicated processes to analyse the data with lighter requirements on input data quality, resulting in poor and lower quality simulation results.

The aforementioned issue of the heavy time-consumption on the input data phase was the main motivation to develop a tool that tries to address this issue and generally enhances the input data phase in DES. The tool is demonstrated as a software solution, called Knowledge Extraction (KE) tool, which extracts raw data from different organization’s data sources, alters this data after processing to useful simulation information and outputs this information in data formats readable and accessible to a range of DES software. Although other data formats are also implemented (JSON (JavaScript Object Notation), spreadsheet) the Core Manufacturing Simulation Data (CMSD) is suggested as the primary output format of this tool. CMSD was designed after a collaboration of NIST (National Institute of Standards and Technology) researchers with industrial partners under the guidelines of SISO (Simulation Interoperability Standards Organization) [6, 7].

The purpose of this paper is to demonstrate the KE tool presenting the use of this tool in a real case study. Note that the KE tool is not aimed to achieve the functionality requirements