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**DRAFT: A DATA- AND KNOWLEDGE-DRIVEN METHODOLOGY FOR  
GENERATING ECO-INDUSTRIAL PARK ARCHITECTURES**

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**ABSTRACT**

Industrial symbiosis can be understood as the substitution of new resources used in an industrial process by another resource that would otherwise be discarded. Industrial symbiosis can thereby create new revenue streams and at the same time reduce environmental impact. The initial step in creating an industrial symbiosis is the identification of potential symbiosis relationships between production plants. This step is challenging, as information about the companies is often not available. Several software tools have been developed in order to identify potential symbiosis opportunities. However, these tools have the shortcoming that they require extensive data input from companies owning the production plants. This requirement limits the number of companies for which symbiosis opportunities are identified. In this paper, we propose a data-driven methodology for identifying industrial symbiosis and generating eco-industrial park architectures. The methodology is based on meta-models of industrial plants for identifying plant attributes for certain types of plants, correlations that estimate the rough amount of resource supply and demand of a plant, and a rule-based system that identifies symbiosis opportunities based on knowledge from successful symbioses. Based on the symbiosis opportunities, the approach generates eco-industrial park architectures that are optimal in terms of economic and environmental performance. Finally, we apply the methodology to a case study of the existing Kalundborg eco-industrial park to evaluate if the methodology is capable of finding existing symbioses. We conclude that the methodology can be applied to screening industrial zones with standard types of industrial plants. However, results always depend upon the types of existing industrial plant meta-models in the database. Future work will focus on extending the data and knowledge base; and validating the methodology by its application to other existing eco-industrial parks.