Motivation:
Production Systems in the future face challenges in their high level of complexity and frequently changing products/machines. These changes require changing the running production processes controlled by embedded software. Current approaches, e.g., MechatronicUML, are proposed to tackle the complexity of production systems and their embedded software by modeling their structure and behavior. In these approaches, the production systems were either stationary or with predefined reconfigurations at the best. Integrating techniques from Artificial Intelligence, e.g., Automated Planning, can generate flexible reconfigurations which do not have to be predefined. Automated planning techniques depend on the description of machines/products in a planning-specific language, like PDDL. Moreover, production engineers use standards, e.g., ISO 10303, to describe products in a computer-interpretable description. The compatibility between these different descriptions, however, should be maintained for the sake of consistency and in order to enable the execution of generated plans. The need to maintain the compatibility between planning and model-driven methodologies is still unfulfilled.

Goals:
To overcome the previous problem, a model-driven development approach is required to integrate between the machine/product models and their planning description. This approach can be based on selected examples of modeling languages and standards to model the machines/products, and their planning problem. In order to maintain the compatibility between different descriptions, appropriate transformations are required.

Duties:
A theoretical survey to select languages/standards to model machines/products, and their planning problem. Investigating the possibility to extract the planning problem description from the machine/product models according to the selected languages. Building transformations from the machine/product models to the planning language. Modeling of a production system and its products with the selected modeling approaches as a case study, and obtain its planning problem description using the built transformations.

Requirements:
- Basic theoretical knowledge in modeling, meta-modeling is vital.
- Practical knowledge in modeling and meta-modeling (EMF, QVTo, ...) is a plus.
- Theoretical research skills.
- Having very good English skills.

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