Abstract: Platform-based product families have become an important strategy in many industries as a wide range of products can be offered to the customers while achieving economies of scale in design and manufacturing. During the life cycle of a product family, the amount of derived product variants increase due to numerous internal and external driven reasons. This leads to additional complexity within the product family as variety and the dynamics raise. This paper presents an approach to evaluate the additional complexity costs, originating from changes within the product family. The approach combines change-propagation methods with cost calculation methods. The approach differentiates between costs based on changes of existing variants and costs based on changes leading to substituting or additional variants. Variety-inducing change drivers are assigned to affected product components and functions. All affected components, especially the
indirectly changed-ones, are identified by domain-spanning change propagation. This incorporates geometrical and functional dependencies between components. Running as well as one-time expenses are determined by a process-based costing system taking into account the required additional processes and their duration to handle the added complexity. The approach is implemented into a software tool, using data of an industrial product family. An industrial case study is conducted for evaluation of the approach and the tool. Exemplary changes showed that the amount of cost caused by indirect changed components represents about half of the total complexity costs.

Stichworte: complexity costs, engineering changes, change propagation, product family

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