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C. Stechert / H.-J. Franke

Requirements in Multidisciplinary Context

INTRODUCTION

This work focuses on the development of a common basis for requirements modeling. It supports communication between different disciplines and therefore helps identifying important requirements and relations between them. That is crucial in early phases of the design process and in later phases. Not less crucial is to bring early and later phases together by predicting possible changes and by estimating the presumable impact.

MODELING REQUIREMENTS

Not only in a collaborative network, but in every major development process the system has to be decomposed into a smaller, manageable, and at the same time consistent subsystems (subtasks). A requirements model should force the development process to fulfill the initial customer needs onto the whole system, but also the enterprise internal requirements and constraints, as well as laws and regulations.

The presented modeling approach uses SysML [3] as a widely known notation in engineering. It allows us to model product surroundings, structure and relations.

One of the first steps in the development process is to analyze the product surroundings [1]. Here, the whole product lifecycle has to be taken into account including different scenarios (use cases), with all related actors, surrounding environment and possible disturbances. Furthermore, the different product views from different domains have to be considered and those requirements generated by later development steps (simulation, manufacturing) should be gathered. A systematic documentation helps to identify and to use the collected requirements and constraints.

For a better accessibility information should be structured. Requirements can be structured in a hierarchy such as goal, target, system requirement, subsystem requirement. Furthermore, they can be allocated to a domain and to a purpose in the development process. Getting more concrete, requirements can be allocated to their concerning subsystems. In addition to well established attributes (wish / minimum / fixed,

source) it makes sense to assign certainty and change probability.

One important aspect during the development of complex products is to detect goal conflicts as early as possible. As the system is subdivided into many different subsystems of different domains and diffuse boundaries, it is difficult to trace relations. A classification [5] allows to systematically add relations into the model and to detect goal conflicts both in early qualitative and later quantitative phases. Relations can be tracked and therefore the impact a certain change will have on the whole system can be estimated. Knowing the (un)certainty of a specific requirement and following the change path give an idea of where to design “flexibility” into the system.

The development of parallel robots is used as an example for multidisciplinary product development. A parallel robot is a mass customization product that highly involves different engineering domains. For more details about parallel robots refer to [4, 2, 6].

CONCLUSION

This paper shows an approach to model requirements in a multidisciplinary environment. The shown types of relations help structuring the complex requirements relationship model and identifying the important requirements and links between different domains.

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