

Abstract

The aim of this PhD thesis is to describe an efficient and user-friendly development process for vehicle configuration rules. The development of vehicle configuration rules precedes the sales configuration, and is the process of authoring, evaluating and releasing configuration rules sets. The vehicle configuration rules are logic expressions using IF, AND, NOT, OR etc. An example of a vehicle configuration rule is IF(*seat heating ventilation*) THEN(*comfort seats*).

The research method was to analyse the development of vehicle configuration rules by focusing on 1) configuration information models, 2) configuration rules visualization methods and 3) configuration rule development methods. The result from the first research paper was a vehicle configuration information model, which then all the following research papers was based upon. The configuration information model should therefore be seen as the most central research contribution of this PhD thesis. The aim of a more efficient and user-friendly vehicle configuration rules development process was fulfilled by developing a new configuration rules visualization method. This new matrix-based configuration rules visualization method uses an inference engine. The inference engine draws conclusions based on computations of the vehicle configuration rules. The conclusions are then shown in the matrix-based vehicle configuration rules visualization. The computations were previously done manually by the product developer, and hence required some training and time for doing configuration rule analysis.

The usability and time-efficiency was evaluated with formative usability tests. These tests were conducted with product developers from the automotive industry. The product developers answered the test questions within minutes instead of hours/days/weeks.

The conclusion is that vehicle configuration rules development processes could become more time-efficient and user-friendly by developing the configuration rule visualization tools. The introduction of inference engines addresses the needs of the product developers. There is, however, more research needed on the development of vehicle configuration rules. Especially, research is needed on complexity management and product rationalisation.

Keywords: vehicle configuration; configuration rules; development process; matrix-based visualization; inference; information modelling; process modeling.