

**Title:** Usability Engineering in the rail sector: creating a virtual learning environment for rail traffic controllers

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A rail traffic controller is responsible to regulate the movement of trains on the railway and ensure safe railway operations. In Germany three years of apprenticeship are necessary to work at a signal box. Trainees have to understand existing rules, regulations and procedures with a high complexity. There are also many local characteristics and operational details which need to be considered in everyday work. But despite three years of training, rail traffic controllers can't work alone at a signal box the first months after apprenticeship. One reason is a lack of vocational action competences.

Referred to these difficulties, trainees wished for more support besides vocational training and additional tools to learn and practice at home. For taking this into account the idea of creating a learning environment for trainees came up. It should not replace learning in class, but support the trainees while learning independently and improve the transfer of learned content into practice.

The presentation will illustrate the usability engineering approach which was used to create a prototype of the learning environment. It was developed in cooperation with students of FH Erfurt (University of applied sciences). All of them were experts in railway operations and worked as rail traffic controllers or train drivers. They identified critical training contents and provided ideas in the development of the software, regarding a concept for the learning environment and design drafts. In addition, feedback of trainees was included in every step of the usability engineering process.

The concept and the prototype of the learning environment will also be presented. The learning environment provides a toolbox for independent learning for trainees doing an apprenticeship as rail traffic controller. It contains of a learning section where different topics (railway operations, signals and technology) are presented. These contents consist of explanations, recommendations for actions, videos and other interactive content. A test section is also included. In this section the trainees can repeat the contents they learned but also check their advance in learning. Domains where knowledge gaps exist can also be shown to the trainees, which enable a goal-directed learning.

A final feedback of the prototype regarding usability showed good results, especially in learnability. That demonstrates the importance of a usability engineering approach and the inclusion of users' feedback in the development of new software in the rail industry.