

### **Introduction**

As user-centered development (UCD) involves users for an understanding, objective assessment and utilization of their needs, it represents a promising approach to develop improved user-friendly prostheses. Hence, human factors have to be identified and integrated into development.

### **Methods**

To identify relevant factors and assess the amputees' requirements, a literature review , questionnaire Results and interviews are considered. Further, models of the identified factors' impacts on the development and Quality Function Deployment (QFD) for the translation from the human understanding to technical design are prepared for evaluation with amputees. The important body scheme integration (BSI) is examined in experiments with unharmed subjects exploring a Rubber Leg Illusion similarly to the Rubber Hand Illusion.

### **Results**

Besides BSI, satisfaction and feeling of security (FOS) show to be important factors for UCD. Satisfaction is linked to quality of life (QoL) and time of daily use and influenced by appearance, usability and functional properties of prosthetic components. FOS seems to be an issue of the overall system leading to reliability and balance during use. BSI also affects QoL and might lead to more user-friendly prostheses. Technical functions (enabling) contrary to characteristics from the user's view (predisposing) seem to be perceived as different properties. The first ones are utilized: Functional units are identified and assessed. Models and QFD are used for their evaluation and translation to technical development. The technical functionality is reviewed and extended based on a comparison of functional and psychological aspects of the units and the overall concept.

### **Discussion**

The elaborated approach should enable to involve users during the whole development process. Yet, it is not validated with a sufficient number of users.

### **Conclusions**

Substantiating this approach with sufficient data is necessary – e.g., a comparative analysis to solve conflicting goals. It is promising for the development of future user-friendly prostheses.