Mobility and load measurements in above-knee amputees

The currently applicable standard ISO 10328 defining the structural test procedure of lower limb prostheses is based on measurements from the 70s. Since then the technology used in prosthetics has developed further also increasing the patient's mobility. The design of functional and safe prosthetic components requires to know how they are used by the amputee in their everyday life.
For this purpose the author developed a mobile measuring system to be integrated into an exo-prosthesis. It was used in an one year study with 15 above knee amputees to record for the first time continues data of daily activities and loads over such a long period.
Simone Oehler analyzed the measured data in her PhD considering different aspects in order to be able to create future designs, functions and especially testing in a realistic way. The results allow to measure mechanical stress and strain in the prosthesis with respect to type, duration and frequency and also to quantify the usage of the prosthesis and the patient's activity.
The testing parameters of the currently applicable standard can be reevaluated now for topicality and necessary changes. In the long run, the gathered measurement data will contribute to the further-development of different test methods. Moreover the data permit to influence dimensioning and the user-related design of functional and structural prosthetic components helping to ensure that the principles of a load related design are applied. In addition, the gathered data allow a more precise prognosis on a useful usage time and life span of the products improving this way the amputee's safety and quality of prosthetic treatment.