Usability and user acceptance of a software tool supporting the ergonomic workplace analysis with OWAS: A field study

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Background of the study

As part of the research project ENgAge4Pro a software tool for industrial applications was developed, which captures in detail working postures at the workplace by using the Microsoft Kinect v2 sensor as a low-cost marker-less motion capturing system.
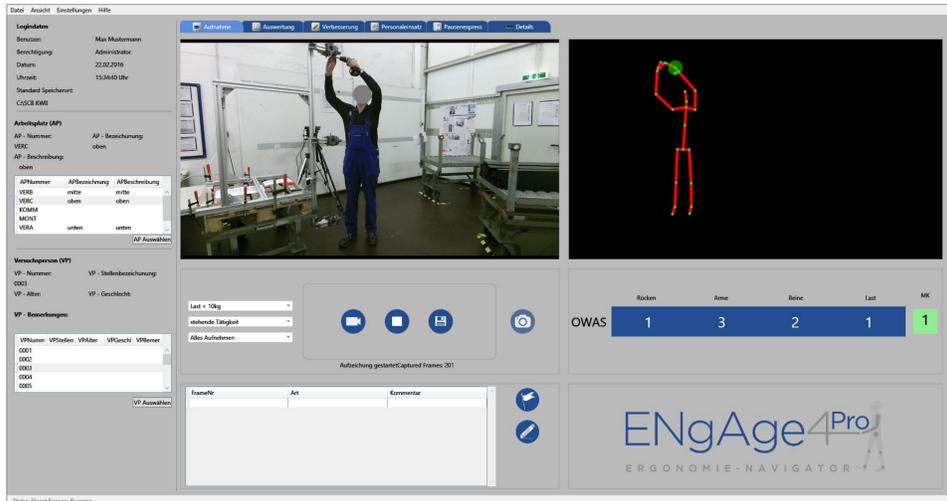

Fig. 1: Semi-automatically capturing and assessing of body postures (GUI)

Based on this, the body postures are analyzed and assessed according to the Ovako Working Posture Analysis System (OWAS) and proposals for the ergonomic interventions are given semi-automatically. Within a one-week field study at a large semi-trailer manufacturer a first prototype of the software tool was tested. Thereby the functionality and usability of the software tool was investigated by seventeen users with ergonomic expertise.
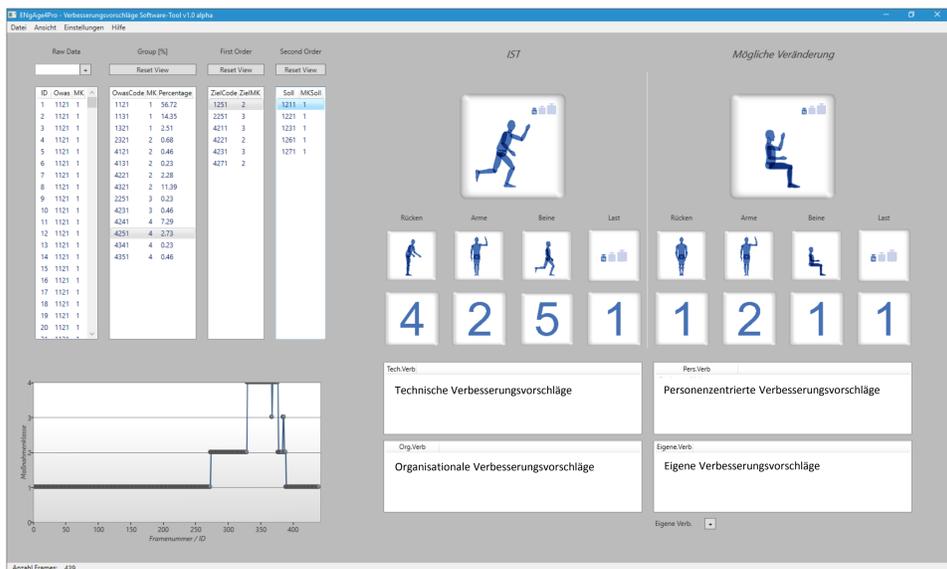

Fig. 2: Proposals for ergonomic interventions (GUI)

Experimental setup and method

- **Three different work settings in the production of a semi-trailer manufacturer**
  - Overhead and front assembly
  - Order picking
- **Two different questionnaires:**
  - Isometrics[S] questionnaire to evaluate the usability
  - Questionnaire with seven statements about acceptance
- **17 Participants for the study:**
  - Team leaders with ergonomic expertise
  - Different production divisions
  - Only male participants
  - Average age about 45 years

Results of the usability study

By 17 potential users, who tested the software tool, the usability was surveyed based on the Isometrics[S] questionnaire. The evaluation of the questionnaires showed a positive result with an overall mean of 3,68 out of 5 points.

Tab. 1: Results of the evaluated Isometrics[S] questionnaire

Dimension	Mean	Std. deviation
Suitability for the task	3,94	0,21
Self-descriptiveness	3,60	0,22
Controllability	3,85	0,27
Conformity with user expectation	3,64	0,14
Error tolerance	3,38	0,21
Suitability for learning	3,67	0,51
Overall mean	**3,68**	**0,18**

Scale: 1 = strongly disagree 2 = disagree 3 = so-so 4 = agree 5 = strongly agree

Results of the user acceptance study

The questionnaire about user acceptance and functionality displayed a positive result as well. The average score amounted 3,8 out of 4 points. Furthermore the participants could answer an open question about suggestions for improve the software tool to make it more user-friendly and comply with user needs.

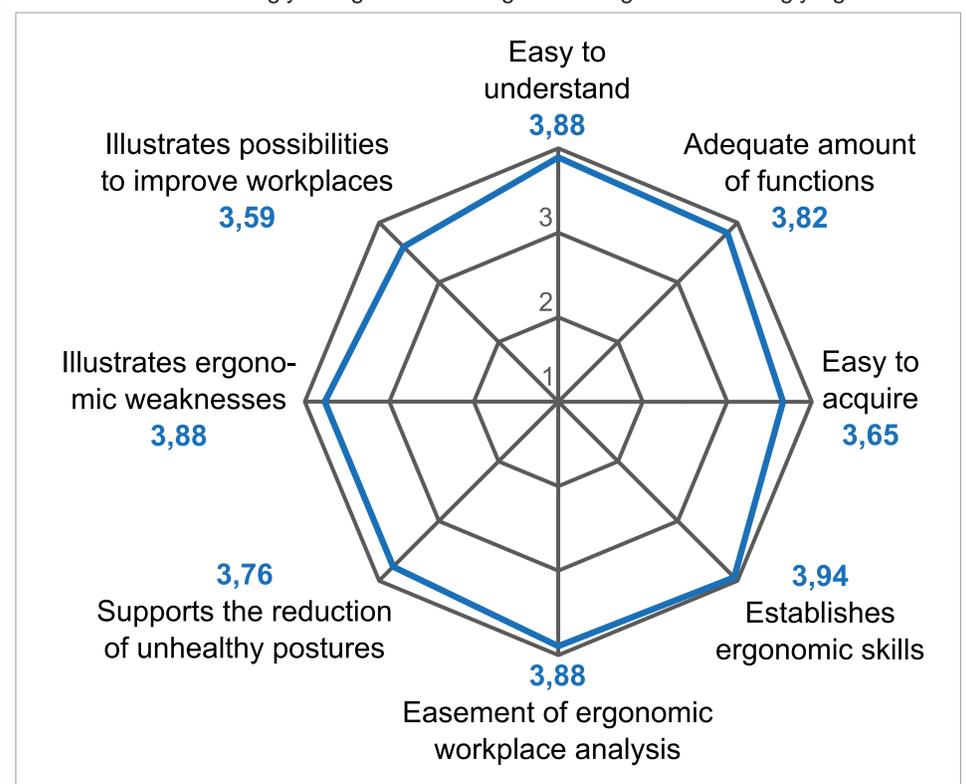Scale: 1 = strongly disagree 2 = disagree 3 = agree 4 = strongly agree

Fig. 3: Results of the evaluated questionnaire about acceptance and functionality

Conclusion and further action

The usability, functionality and user acceptance of the developed software tool for semi-automatically capturing body postures and assessing them according to OWAS could be tested during an one week field study. The results of the study reflects a very positive feedback about the software tool by potential users with an ergonomic expertise.

Based on the results and especially on the constructive improvement suggestions the software tool could be refined during an iterative process of improvement.