

Validating a Heuristic Evaluation Method - An Application Test

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Hypothesis

Using socio-technical heuristics will support people to detect more problems of a socio-technical design than an inspection without the heuristics.

This assumption is grounded on the literature on heuristic-based usability evaluation.

Similarly, we expected that applying a set of sociotechnical heuristics implies an effect of improving evaluations.

A formative socio-technical evaluation should identify positive or critical implications of sociotechnical system. Specifically, a more thorough inspection of a sociotechnical system from different perspectives was predicted.

Approach

Integration of training - i.e. the transfer of knowledge about the heuristics - **with the testing** of the effects of applying the heuristics.

An **experiment with 60 students** was conducted. They were not experts at the intersection between work design and sociotechnical design.

The participants were divided in **two groups**. Each group evaluated two sociotechnical systems.

One system was evaluated **without**, the other system **with** the sociotechnical heuristics.

The evaluated systems were represented by short (3 minutes) promotional videos presenting a sociotechnical work environment where **smart glasses** are used.

The participants were asked to document any **positive or critical aspects** they could observe.

Sociotechnical Heuristics



1. Visibility about task handling and feedback about its success



2. Flexibility for variable task handling leading to a participatory evolution of the system



3. Communication support for task handling and social interaction



4. Purpose oriented information exchange for facilitating mental work



5. Balance between effort and experienced benefit by organizational structuring of tasks



6. Compatibility between requirements, development of competences and the system's features



7. Efficiency-oriented allocation of tasks for pursuing holistic goals



8. Supportive technology and resources for productive and flawless

Herrmann & Nierhoff (2019): Heuristiken zur Evaluation digitalisierter Arbeit bei Industrie-4.0 und KI-basierten Systemen aus soziotechnischer Perspektive

Challenges/Results

Unexpectedly, the overall **number of documented observations decreased**.

The observations were slightly **more evenly distributed** among the heuristics under the with-condition. Heuristics with negligible amounts of observations under the without-condition were recognized by several participants in the second round.

The participants' individual **prior experience and knowledge** in evaluating work systems **was not surveyed**, although it turned out that they should have been controlled.

This could have helped to analyze whether the severely different performances of both groups can be attributed to different levels of experience.

The level of knowledge and experience acquired prior to this study **prevents a generalized conclusion**. The effects of training and fatigue were not controlled in this study.

This study examined only short, promotional videos as documentation of sociotechnical systems. The respectively presented single workflows serve as samples. A comprehensive evaluation of a sociotechnical system was not intended in the scope of this study.

Missing information on the sociotechnical context is a possible reason for shortcomings of the performed evaluations.

Augmented Reality glasses in a logistic warehouse



<https://www.youtube.com/watch?v=8QWhGivR4Ns>

Augmented Reality glasses for elevator maintenance



<https://www.youtube.com/watch?v=ZWsbHISQjA>

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Conclusion

The assumption to see a **significant increase in productivity** at the group level was **not confirmed**. Instead, the number of documented observations decreased after the heuristics were introduced.

The heuristics did also **not induce the investigation of aspects** which were not considered prior to their training.

Further research has to investigate the effects and possible causes for adverse effects on the level of individual participants rather than the group level.

Prior to testing the participants' skill in evaluating sociotechnical systems, a **thorough assessment of their individual knowledge and experience** needs to be performed. Alongside the competence level of the participants, determining their domain of expertise is crucial.

Studies which **investigate and measure the effects of heuristic evaluation** methods, e.g. in usability testing, are **not widely performed or available**.

As seen in this study the intuitive assumption of **improvement through application of heuristic methods does not necessarily hold true**. This might challenge the quantitative effect of established heuristic methods.