

Challenges and concepts for the evaluation of usable and satisfying VAs according to DIN EN ISO 9241-11 and -110

Dominik Pins & Dennis Paul

Fraunhofer Institute for Applied Information Technology FIT

Dominik.Pins@fit.fraunhofer.de, Dennis.Paul@fit.fraunhofer.de

I. Abstract

AI Systems are built to increase efficiency, productivity, and reliability from an economic perspective. Assistance systems like voice assistants (VAs) belong to this kind of interactive technology; yet based on the Intelligence Augmentation approach, they should primarily support the users' capabilities and allow them to continue acting with self-determination. Nevertheless, those systems are usually perceived as a black box. Thus, on the one hand, VAs can be seen simply as a tool for fulfilling a task, although on the other hand, the conversational interaction always raises expectations and needs for humanlike interactions. According to the international norm ISO9241-11, a *usable* system is one that can be used to achieve specified goals with effectiveness, efficiency, and satisfaction. We use this definition of usability to delineate a framework for the design and evaluation of VAs, based on current literature and international norms. Our aim is to provide guidelines that move the development of VAs towards enhanced usability and human-centeredness. Considering each usability level in turn, we discuss first, how to fulfill context-based *user needs* and requirements in order to ensure effectiveness of the VA interaction. To address the efficiency level, we develop evaluation guidelines for VAs based on the *interaction principles* according to ISO9241-110. Regarding user satisfaction, we posit that certain human values like trust and welfare are crucial for a satisfying user experience with VAs. Specifically, the system should support psychological *human needs* in order to ensure the users' self-determination – for practicing design and evaluation of VAs in a wholesome manner.

II. References

- Adams, A & Sasse, M. A. (1999). Users are not the enemy. *Communications of the ACM* 42, No. 12: 40–46.
- Fischer, G. (2020). Quality of Life in the Digital Age: Exploring Design Trade-Offs between Artificial Intelligence and Intelligence Augmentation. <http://13d.cs.colorado.edu/wordpress/wp-content/uploads/2020/05/paper-for-Homepage.pdf>
- International Organization for Standardization (2018). Ergonomics of human-system interaction – Part 11: Usability: Definitions and concepts (ISO Standard No. 9241-11:2018). <https://www.iso.org/standard/63500.html>
- International Organization for Standardization (2020). Ergonomics of human-system interaction — Part 110: Interaction principles (ISO Standard No. 9241-110:2020). <https://www.iso.org/standard/75258.html>
- Ryan, R. M. & Deci, E. L. (2017). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Publications.