

Exploring Smart Watch Ecosystem Value Co-creation Experience: A Qualitative Case Study

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Dr. Iqbal is currently working as Assistant professor at Linnaeus University. He has received his Phd in the field of Computer and Systems Science from department of Computer Science, Electrical and Space Engineering at Luleå University of Technology (LTU). Dr. Iqbal has experience of pedagogical development of different courses and E-learning platforms to teach Master Program in Information Security. He has been teaching at Master level courses for Information Systems and Information Security programs. His research interest is in the realm of Information Systems including E-health, Information Management, Information Security, Information and Communication Technologies for development (ICT4D) and E-learning.



Publications:

- Ostheimer, J. & Iqbal, S. Privacy in online dating: does it matter? 3rd International Conference on Cryptography, Security and Privacy Kuala Lumpur, Malaysia — January 19 - 21, 2019. ACM Publications. p. 71-75.
- Iqbal, S., Jokela, P., Hammar, T., & Nilsson, A. Sustainable Healthcare Systems – Holistic Perspective on the Use and Impact of Medication Management Robots in Home Healthcare. Scandinavian journal of Information Systems (SJIS) Scandinavian Journal of Information Systems, 2021, 33(2), p.6.
- Ostheimer, J., Chowdhury, S. & Iqbal, S. Creating an ALLIANCE OF HUMANS AND MACHINES: HYbrid intelligent systems and their design principles. Ostheimer, J., Chowdhury, S. and Iqbal, S., 2021. An alliance of humans and machines for machine learning: Hybrid intelligent systems and their design principles. Technology in Society, 66, p.101647.
- Duaa, A.K., Iqbal, S., & Jokela, P. Electronic Health Records - Non-Swedish Speaking Refugee's Perspective. In proceedings of 18th International Symposium on Health Information Management Research (ISHIMR Conference 2020). ISBN:978-91-89081-09-3.
- Iqbal, S., 2016. Design and emergence of a pedagogical online InfoSec Laboratory as an ensemble artefact. Journal of Information Systems Education, 27(1), p.17.
- P. Michelle, Iqbal, S. Investigating the Compliance of the GDPR: Processing Personal Data On A Blockchain. 2021 IEEE 5th International Conference on Cryptography, Security and Privacy. 978-1-7281-8620-7/21/\$31.00 ©2021 IEEE

Dr. Jokela is Associate Professor in Informatics at Linnaeus University, Sweden. Her current research interests lie primarily in the field of digital transformation in healthcare and higher education, with a special focus on a systemic perspective on implementation and evaluation of digital technologies in these contexts. Systemic view in healthcare comprises how new technologies affect patients and their family, as well as the working conditions of health care professionals and home care staff. In higher education, the systemic view includes digital support for learning and teaching activities, and thus the working conditions of both students and teachers. Moreover, in both contexts, it is crucial to ensure that the digital innovations enable the most prudent use of the limited human and technological resources.



Selection of publications

- Rahman, J.M.S., Nilsson, E., Nilsson, A., Bergman, P., & Jokela, P. (2022). Digital Health Testbeds in Sweden: An exploratory study. *Digital Health*, 8, p. 1–21.
- Dalipi, F., Jokela, P., Kastrati, Z., Kurti, A., & Elm, P. (2022). Going digital as a result of COVID-19: Insights from students' and teachers' impressions in a Swedish university. *International journal of Educational Research Open*, 3, p. 100136.
- Hammar, T., Hamqvist, S., Zetterholm, M., Jokela, P., & Ferati, M. (2021). Current Knowledge about Providing Drug–Drug Interaction Services for Patients—A Scoping Review. *Pharmacy*, 9(2), p. 69.
- Villius Zetterholm, M., Lin, Y., & Jokela, P. (2021). Digital contact tracing applications during COVID-19: A scoping review about public acceptance. In *Informatics*, 8(3), p. 48.
- Ferati, M., Bertoni, M., Dalipi, F., Kurti, A., Jokela, P., Anderberg, P., & Mirijamdotter, A. (2021). Tackling the Sustainability of Digital Aging Innovations Through Design Thinking and Systems Thinking Perspectives. In *International Conference on ICT for Health, Accessibility and Wellbeing* (pp. 179-184). Springer, Cham.

Introduction

- IoT devices, such as smart watches and other wearables, are emerging at a rapid speed and they have engaged the users in redefining their interaction with mobile and pervasive technologies by creating an ecosystem of relevant devices (Figure 1).
- Smart watches are one of the most popular wearables categories globally and are expected to reach shipments of more than a quarter of a billion units by 2025, currently, with the Apple watch installed base reaching over 100 million users worldwide in 2020.
- Smart watches have the potential to support health in everyday living by: enabling self-monitoring of personal activity; obtaining feedback based on activity measures; allowing for in-situ surveys to identify patterns of behavior; and supporting bi-directional communication with health care providers and family members.

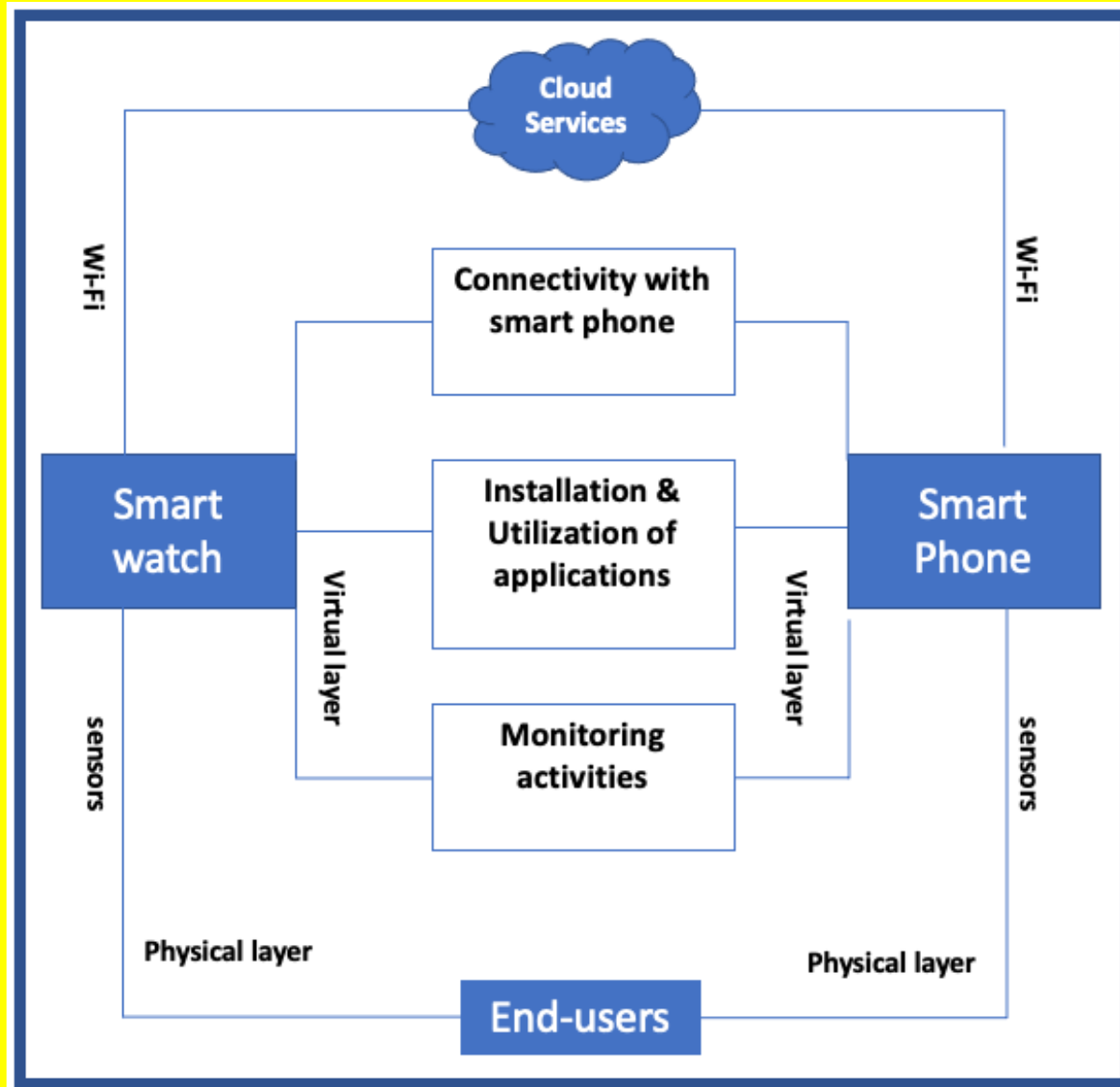


Figure 1: Smart Watch Ecosystem

Research Focus

This research work focuses on the question: how different users interact with the smart watch ecosystem to participate in the value co-creation process through their expectations, skills, and abilities.

Methodology

- This research work adopted a qualitative research method. We selected the sample users belonging to different professional / educational backgrounds to gather responses from a wider audience.
- The purposeful sampling required to select project participants who own an iPhone since the apple smart watch is only compatible with iPhone. Another salient feature was that the participant must be technology literate to understand and operate both the devices successfully without any tutorial provided.
- Two types of participants were targeted: *novices* consisted of users who own a smart phone, they have a desire to use the smart watch, but they did not yet experience any smart watch; *expert users* have been using smart watch regularly for a few years.

Methodology

- As the number of participants was small, all collected data, questionnaire answers, interview transcripts and observation notes, were considered as textual data and analyzed using qualitative methods.
- Lichtman's thematic analysis technique was used to analyze the findings. This qualitative analysis technique comprises the systematic identification, organization and understanding of repetitive patterns within the textual data, through successive construction of codes, categories and themes (concepts).
- This approach was mainly inductive, as the themes were generated based on the collected data. Moreover, the analysis was semantic and descriptive, i.e. the result was a descriptive summary of the explicit content of the data.

Results

Following four themes were generated from the data collected from the participants:

- To get motivated and maintain motivation
- Usefulness – value-in-use and value-in context
- Technical issues with smart watch resources
- Information security and privacy concerns about smart technologies

Results and discussion

- Novice users' intrinsic curiosity about the new technology was an important contribution to getting motivated in the beginning; generally, it was easy to set up and use the smart watch applications.
- Maintaining long-term motivation was challenged by practical issues, such as having to charge the watch regularly, and, most importantly feeling that the watch was superfluous in presence of a smart phone.
- For both novices and expert users, it was crucial that the users perceived that they can easily integrate the smart watch in the their daily routines, so that both *value-in-use* and *value-in-context* were high enough to maintain long-term motivation.

Results and discussion

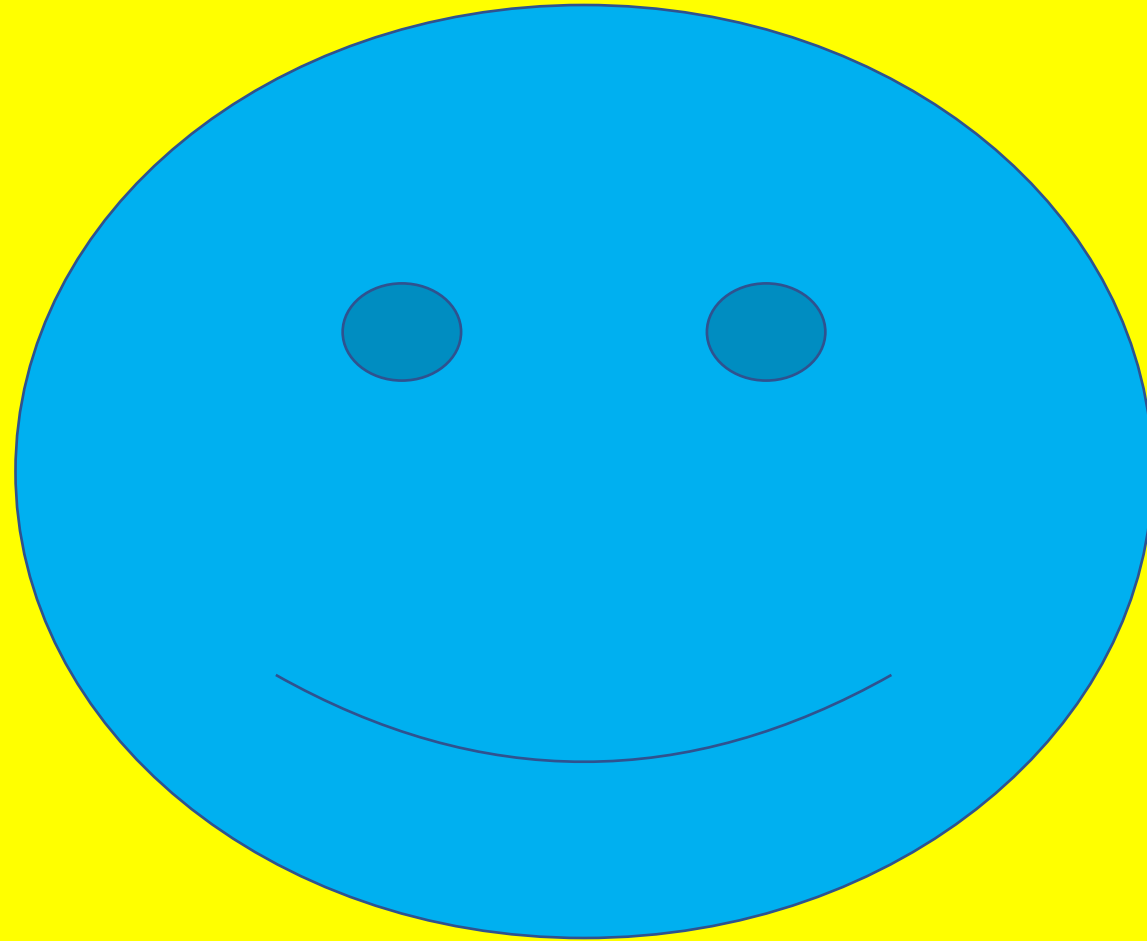
- For both novices and expert users, smart watch functions that help the users to monitor and keep record of health and performance related parameters were the most popular features.
- The COVID-19 pandemic created a special context, where the smart watch health apps could help the users to keep training and exercising, or simply remind them to take a break while working from home.
- Other appreciated features were: data sharing within the smart watch ecosystem, including music and documents; using smart watch as payment resource.

Results and discussion

- Some health related apps – e.g. ECG – were not available in all countries.
- Some younger novice users had concerns about privacy, they worried that if their activities were monitored and tracked by the smart watch, the data could be compromised.
- Generally, different users have different value creation processes when they collaborate and interact with innovative technology (*value-in-use*). The service providers make value propositions by offering access to the smart watch ecosystem, but the actual value of the service is perceived and defined by the users, through their expectations, skills and abilities, and based on their current circumstances (*value-in-context*).

Conclusion & Further Research

- We conclude that despite some shortcomings, the smart watches have the potential to support health related interventions, such as focusing on exercises, and monitoring own health activities.
- In this study, the sample size was small, hence, large scale studies with a larger number of participants are required in the longer run to validate the claims regarding technical functionality, adoption, and effectiveness in supporting health and well-being of the individual users, particularly those with specific health issues.
- IoT based smart watch ecosystem can support people in several areas of their daily life to achieve certain objectives in a smart way that includes physical fitness and well-being, entertainment, shopping, and socializing with other people through communication.



Thank You



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