

Evaluating privacy, security and regulation concerns for sensory-based assistive technology

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1. INTRODUCTION

The number of seniors in the Dutch society has risen by seven percent in the last thirty years [1]. It is expected that this growth will continue on, which means that more seniors will be in need of care in the coming years. The growth of people working in senior care is not in line with the growth of the seniors [1]. This means it will be challenging to provide care for everyone that needs it. However technology may be able to fill in the gap.

A robotic companion named Paro was tested with the aim to reduce stress and loneliness in care facilities [2,3]. Another technology assisted approach is for caretakers to make use of Smart Homes to monitor their clients and provide help when needed [4]. Data collection is how assistive technology can evaluate the Quality Of Life (QOL) of seniors. The Smart Teddy [5] from The Hague University of Applied Sciences (THUAS) is a project which aims to help seniors with dementia to live independently in their own homes. Sensors allow caregivers to assess the QOL and intervene when required. In this project we take a look at the laws and regulations surrounding data collection using sensors in assistive technology. We also examine the literature on privacy concerns the public has towards such technology. An analysis required by the General Data Protection Regulation (GDPR) will reveal the risks in the Smart Teddy project in terms of privacy and security and show how to mitigate them.

2. THE SMART TEDDY DEVICE

The Smart Teddy is a therapeutic device in the form of a teddy bear. It includes multiple sensors that collect data from the home. AI algorithms determine what the data means in terms of QOL, which is then presented in a graphic dashboard to the caretakers. The development of the Smart Teddy occurs in two phases, namely the Research-Phase and the Production-Phase. In the Research-Phase, all personal information is anonymized since the data will only be used to configure the algorithms that estimate the QOL. Data in the production phase is linked to the user to inform caregivers about the QOL and alert them in case of danger.

4. LAWS AND REGULATIONS REGARDING PERSONAL DATA

The Smart Teddy project makes use of personal information and therefore must follow the General Data Protection Regulation (GDPR). The GDPR states that a processing agreement needs to be made between the responsible entity and the processor of the personal data. Because the Smart Teddy project collects data about people's health and lifestyle, there will have to be additional restrictions and measurements to guarantee data security. The results from the Data Protection Impact Analysis (DPIA) [6] tell us how this will be achieved (see Section 6).

5. CONCERNS ABOUT PRIVACY

Assistive technology can play a meaningful role in future healthcare, however it can also cause privacy concerns due to the collection of data. People differ on defining privacy [7], and some share more than others. The result of sharing information also matters. When sharing information leads to access to certain products or services people are more inclined to make that decision [8]. The literature says the acceptance of smart technology in homes or assistive technology is generally low [9]. Seniors and people who suffer from health problems are more accepting towards assistive technology but worry about losing human contact [10].

6. DATA PROTECTION IMPACT ANALYSIS (DPIA)

A DPIA [6] was conducted to identify risks to data security and privacy. A DPIA is required under the GDPR article 35 every time a project starts that may involve a risk to people's personal information. Changing what technology is used in a project in the future means the DPIA will have to be carried out again [6].

6.1. Data

The data collected during the Research-Phase of the project is exclusively used to train behavior monitoring algorithms. For example, audio data is used to track eating patterns and social contact. Given consent from the seniors who may make use of this product is always required before the product can be used. If they later feel they no longer wish to use the Smart Teddy they should be able to withdraw their consent.

6.2. Involved parties

During the Research-Phase no third parties other than the care-home facility are involved in the development of the Smart Teddy. When the project goes into the Production-Phase, outside parties will be involved. In compliance with article 9 of the GDPR, personal data will not be shared with production parties. Due to anonymizing personal data and data collected from sensors, there is no way to trace it back to an individual. Because of this the data is no longer seen as personal data according to the GDPR (GDPR, Recital 26).

7. CONCLUSION

Developers are working hard on utilizing technology to improve QOL for seniors. However, privacy among seniors is a sensitive issue. During the development of the Smart Teddy, anonymizing data helped bypass privacy concerns. Once the technology goes into production, more barriers need to be overcome.

References

- [1] Statistics Netherlands (CBS). (2022). retriever from <https://www.cbs.nl>
- [2] Wada, K., & Shibata, T. (2007). Living with seal robots—its sociopsychological and physiological influences on the elderly at a care house. *IEEE Transactions on Robotics*, 23(5), 972-980.
- [3] Demiris, G., & Hensel, B. K. (2008). Technologies for an aging society: a systematic review of “smart home” applications. *Yearbook of medical informatics*, 17(01), 33-40.
- [4] Demiris, G., & Hensel, B. K. (2008). Technologies for an aging society: a systematic review of “smart home” applications. *Yearbook of medical informatics*, 17(01), 33-40.
- [5] de Boer, B., van Exel, T., & Alers, H. (2019, November). Automating the Measurement of Quality of Life in Senior Citizens with Early-Stage Dementia using Smart Technology. In *Aml (Workshops/Posters)* (pp. 106-110).
- [6] Weber, R. H. (2014). Privacy management practices in the proposed EU regulation. *International Data Privacy Law*, 4(4), 290.
- [7] Solove, D. J. (2008). Understanding privacy.
- [8] Huberman, B. A., Adar, E., & Fine, L. R. (2005). Valuating privacy. *IEEE security & privacy*, 3(5), 22-25.
- [9] Himmel, S., & Ziefle, M. (2016). Smart home medical technologies: users' requirements for conditional acceptance. *i-com*, 15(1), 39-50.
- [10] Chung, J., Demiris, G., & Thompson, H. J. (2016). Ethical considerations regarding the use of smart home technologies for older adults: an integrative review. *Annual review of nursing research*, 34(1), 155-181.