Caring is Sharing – Exploiting the Value in Data for Health and Innovation
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Secure Sharing of Health-Related Data: Research Description of the VINTER, DELFIN, and HEIDA Projects

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Abstract. The need for secure and integrity-preserved data sharing has become increasingly important in the emerging era of changed demands on healthcare and increased awareness of the potential of data. In this research plan, we describe our path to explore the optimal use of integrity preservation in health-related data contexts. Data sharing in these settings is poised to increase health, improve healthcare delivery, improve the offering of services and products from commercial entities, and strengthen healthcare governance, all with a maintained societal trust. The HIE challenges relate to legal boundaries and to the importance of maintaining accuracy and utility in the secure sharing of health-related data.

Keywords. Artificial Intelligence, GDPR, Sensitive Data, Privacy Preservation

1. Introduction and Presentation of the Projects

Technological advancements, resource-related insights, and changing demands on healthcare have made it evident that health-related data is a valuable asset. Data-driven patient outcome prediction, treatment planning, and resource optimization have great potential for improving health care. Data sharing may support awareness and compliance with treatments, suggest novel treatments, and speed up the resolution of complications or disease. With life-long chronic diseases, e.g., type I diabetes, the intersections between health care providers, the individual, and commercial entities, already constitute vibrant areas where values derived from data are created and exchanged. Sharing healthcare data between providers and utilizing it outside of traditional healthcare settings holds great potential. However, compliance with regulations like GDPR in the EU and HIPAA in the US, as well as the Cloud Act, present interoperability challenges that must be addressed. A broader adaptation of privacy-by-design may be necessary to maintain social trust in the new digital analytical health services as they rely on the sharing of data.

VINTER: In Spring 2022, a team from RISE won the Vinter innovation challenge hosted by the Swedish innovation authority Vinnova. The solution was based on homomorphic encryption, an emerging technology for confidential computing that makes possible the processing of encrypted data without access to the secret key [1]. The winning entry described analyses of blood glucose values from individuals with type I diabetes by a digital service using confidential computing. It proposed a software infrastructure building block that works as a data intermediary between the individual,

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the health care provider, and a third-party service [2]. *HEIDA:* The VINTER-winning team was consequently awarded funds to develop example software components using homomorphic encryption and related technologies and to investigate business models for their implementation. This project focuses on 1) privacy-by-design solutions that support third-party cloud-based digital services and 2) the support of public sector efforts in using federated learning. The quest is pursued together with two public sector entities in western Sweden responsible for health care. Homomorphic encryption, alongside federated learning, was listed as a promising technology in Vinnova's recent report on secure data sharing [3]. *DELFIN:* In late spring 2022, Vinnova launched a call for a preparatory phase of building a large-scale demonstrator for system change in using health-related data. The funding agency selected seven proposals, including the DELFIN project led by RISE and supported by a large healthcare provider, a commercial entity, and two patient organizations. The demonstrator aims to exemplify the value of a unified infrastructure where data can be accessed and analyzed by many different parties, such as commercial entities, healthcare providers, individuals, and academic researchers. The initial focus relates to foot ulcers, a preventable complication of diabetes identified to benefit [4] from more efficient sharing of medical examination data including images. The demonstrator aims to be generalizable to other medical settings.

2. Discussion and Conclusions

In the long-term we believe that advanced privacy preservation technologies increase trust in digital society and thereby enable launches of applications previously not feasible due to legal considerations. This benefits both the individual citizen and the innovator by providing alternatives and opportunities. The current work aims at exploring not only the technical circumstances but also how, for example, behaviors, policies, regulations, infrastructure, and markets need to be changed for data sharing with integrity preservation to be practiced, perhaps in an automated fashion in the future. Here, we find inspiration in the Trusted Research Environments model [5] from Great Britain, which describes Five Safes: Safe people, Safe projects, Safe settings, Safe outputs, Safe data. The activities aim for a broader understanding of positioning and use of integrity-preserving technologies in order for society to take full advantage of health data. With the Vinnova Vinter challenge as a starting point, we pursue several paths to determine optimal use of integrity preservation technologies in contexts where data sharing may create value while maintaining personal integrity and societal trust.

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