

An electrical glucose sensor, the quest for true non-invasive detection

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Abstract

Diabetes is becoming a worldwide epidemic. Unmanaged or untreated diabetes can lead to several health problems. The first step in diabetes interventions is the measurement of blood glucose levels. [A company] is developing a novel non-invasive blood glucose sensor for the medical device market which is currently in a pre-prototype phase. For commercialization of the product, the need for an analysis through a socio-technological, technical, social and economical perspective was identified. The goal of the project was to enrich the technical side of knowledge regarding glucose-sensing and to increase the odds of commercialization. This study distinguishes itself from other studies by creating a comprehensive overview of glucose sensing through specific technologies and by defining important market success requirements.

For analysis a combination of the cyclic innovation model, the multi-level perspective, technology acceptance model, open innovation, healthcare economics, competitive advantage and specific technology theory was used as basis of the research. A literature research was performed, experience with the technology was gained through lab work and interviews with a wide range of relevant stakeholders were performed.

Working towards the research goal on the technical side, detection principles were explained. Furthermore, a review of glucose sensors regarding a specific technology was performed. Finally, different technical designs were proposed in the theoretical framework and results. On the economical side, strategies regarding appropriabilities were discussed, open innovation theory was applied to the project and healthcare economics were reviewed for the specific case of non-invasive diabetes sensors. Interviews were performed with various stakeholders. The questions asked were regarding technology acceptance, regulations and standards, competitive advantage and healthcare economics.

Technical evaluation found several technical design additions in literature applicable to the project, allowing for cheap measurement. Economical evaluation of the project defines a need to be cheaper or more effective than comparable medical interventions. A strategy would be to develop the sensor for a specific type of patients. Within this specific group of patients, possible complications might be prevented. Co-creation by involving users has been described in literature as a method of gaining a competitive advantage. For open innovation a certain amount of intellectual property is required, which [a company] currently does not own. A possible strategy to enter the market would be to aim for the change in regulations starting at a specific moment.