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Artificial Intelligence and Health

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Format 1h Interview with Edith Schmid, Managing Director at Kenzen AG Switzerland

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Background The Kenzen Patch is a small, body-worn wearable, which is used for monitoring health. For example, critical biomarkers such as sodium and potassium content are measured using sweat analysis. The aim is to identify and address health risks at an early stage. The patch sends a warning if certain limit values are exceeded. It is already being used by employees in the high-risk industries.

Lessons Learned

- High potential for ethical analysis due to sensitivity of data (health data)
- Value-based design decisions as an expression of a sustainable corporate management culture

Activities

Goal and application

The aim of Kenzen is to **miniaturize and automate** stationary measuring stations and laboratories and to replace invasive procedures (e.g. blood sampling) with non-invasive ones. The «lab-on-a-chip» sweat analysis facilitates the measurement of relevant biomarkers and thus enables a continuous examination of the state of health, which functions in a personalized and context-sensitive manner, and thus enabling a preventative handling of disease. For example, health care costs, which today largely flow into the treatment of chronically ill patients, are to be reduced by, for example, enabling people with high blood pressure, patients with heart failure, or diabetics to attach their own measuring instrument and laboratory to a chip on their body, thus reducing the necessary number of visits to doctors. So far, Kenzen has targeted the unregulated market segments (industry/sport/fitness), and aims to address the regulated markets (health care/pharma) in the long term with a medical product.

Design and technical details

The product developed by Kenzen consists of different components. A small electronic module is attached to the body by means of an intelligent plaster equipped with electrodes. The measured data is then transmitted via Bluetooth to a cloud **where it is evaluated by an automated data analysis**. The results are sent to the device itself as well as to an app installed by the user. The patch on the body has the following functions:

- **Optical sensor:** measures heart rate and heart rate variability
- **Motion sensor:** records e.g. physical activity
- **Thermal sensor:** measures skin temperature and heat flow
- **Moisture sensor:** measures the sweating rate
- **Electrochemical measurement:** the electrochemical measurement is the key novel feature of Kenzen. Different parameters can be measured via an ion-sensitive membrane or enzymatic reactions, which go hand in hand with a measurement of electronic reactions. So far these are: Potassium, sodium and pH value. In the future, measurements of lactate, cortisol, glucose, magnesium and calcium are planned.

Human-machine interface

The feedback to the patient takes place in two ways. Firstly the patch gives direct feedback on the body when a threshold value is exceeded in the form of a **vibration alarm**. Additionally all collected data can be viewed by the user **via an app**. The values are marked here in traffic light colors (high, medium, and low risk).

Ethical framing

Kenzen is aware that the core of its business model also raises many ethically relevant questions: Health data are among the most valuable as well as the most sensitive. With the ability to generate three million data points per day and per person, a potentially very large health database can be created. Various associated questions and problems can be outlined as follows:

- **Data ownership problem**

Kenzen emphasizes that no money should be earned with data without users having a strong conscious role in this business model. A model in the style of Google or Facebook, which supposedly provides services free of charge and earns money from the collected data without the producers of this data having a say, is out of the question for Kenzen.

→ Previous solution strategies lie in **“push-backs”**, i.e. the refusal of requests for data sales from third parties, and the refusal to cooperate with certain companies/actors.

- **“Big Brother” problem**

Data not only have monetary value but are also a control instrument. Kenzen is in an area of risk as far as the use of the data is concerned.

→ A solution strategy here is also the **careful examination of possible partners** and the internal discussion about in principle possible partnerships (e.g. making the decision not to cooperate with the tobacco industry). In addition to the individual sense of responsibility, the risk of damage to reputation was also mentioned as a motivating force for these disputes.

→ A further strategy for this ethical problem is already reflected in the **design of the interface**: There are user-based access levels, each of which contains different privacy settings (end users and technicians have access to the app; Environment, Health & Safety personnel have access to the Team Dashboard; general data from Safety Intelligence is available to managers and risk managers). For example, when working together in industry, the employer does not have direct access to all the data collected about the employees.

- **Quantifying the Self**

With the collection of ever more precise data, Kenzen also joins the trend towards **self-measurement**. The positive side of this is emphasized here.

→ The power of the measured person to act increases vis-à-vis institutions because he himself possesses more knowledge. The key word here is the **empowerment of patients** (or employees).

- **Replacement of the human being by the machine / danger of job loss**

→ The patch is by no means intended to make medical personnel superfluous, but rather to help replace old and immobile laboratory infrastructure and make it more efficient. In this way, healthcare costs could be reduced, in particular by reducing the costs of monitoring chronically ill patients.

Ethical Analysis

At Kenzen, ethical problems are already addressed at various levels. The strategies for dealing with them range from individual case decisions regarding possible business partners to design decisions in the product. An ethical analysis might turn out to be helpful, especially with regard to a systematisation of these approaches, in order to develop an overall strategy for dealing with them. In particular, the high sensitivity of the data collected and the fact that the company operates in unregulated and regulated markets speak in favour of an ethical analysis from the perspective of Kenzen, which can be outlined as follows:

User centred approach

This approach is strongly valued by Kenzen, especially in regard to the question of data:

The keyword here is the empowerment of patients or users. Nevertheless, many decisions are already predetermined by the design of the interface, so that access rights, for example, cannot be individually adapted by the user at the present time. Thanks to a user-centered perspective, questions about the design of the app and the data collected (e.g. switching off certain measurements) could be addressed anew. Other questions, such as the use of resources and waste, could also be addressed with the help of the moral user concept (how often do you have to change the plaster, what material is it made of, etc.).

Top down approach

Kenzen is very critical of an approach to ethical issues that relies on the top-down approach and thus on the demand for regulation. Since start-ups are characterised by innovative products, it is to be expected that regulations are more likely to be obstructive or written too late. In addition, regulated markets pose a risk to start-ups due to high entry barriers to entry (in the medical sector, for example, expensive product testing would first have to be carried out). In contrast to an analysis of legal regulations, Kenzen suggests that a stakeholder analysis is possibly helpful. However, this is very complex due to the different target markets.

Value Sensitive Design

Instead of starting with stakeholders, the product could also be

used to focus on the values implemented in it and their social relevance and scope. The value orientation was described as especially interesting because it fits well into the framing of start-ups: Start-ups are dependent on the orientation of values and the entrepreneurs' willingness to improve, as they generally do not initially function in a profit-oriented manner. A value-based analysis therefore also promises internal benefits, e.g. for employee motivation and stronger identification with the project. According to Kenzen, this could be the potential of the Value Sensitive Design (VSD) that would fit well into its strategies of impact investment (keyword: sustainability) and value proposition. In addition, a VSD-based approach would also allow the advantages of the Kenzen patch to be better explored: In addition to user empowerment (which is already visible in a user-centered analysis), the social benefit of cost savings in the health sector can also be brought into focus. Last but not least, a focus on design allows questions to be asked about the AI itself, which has so far not been the case: Kenzen emphasizes the advantage of personalized and context-sensitive data analysis, which determines individual limit and health values. Health is then no longer measured against normative data that may contain a bias (e.g. because reference groups tend to be male, western, etc.). The question of overcoming bias versus reproduction of bias on the basis of data sets by algorithms can be posed in a differentiated way with the help of the VSD.

Overall, both the user-centered approach and the Value Sensitive Design were perceived as interesting. The latter seemed to coincide better with the self-image of Kenzen as a value-based start-up with a reflected corporate culture.

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