Digital healthcare services

Edith Maier¹ · Ulrich Reimer¹ · Nilmini Wickramasinghe²

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Digital healthcare services in transition

Digitalization is playing an increasingly significant role in practically all areas of society. The domain of healthcare has been moving into the digital world relatively late and only recently has started with digitalizing processes and services on a larger scale. Still, the potential for disruption in the healthcare industry is enormous. Although approaches to healthcare financing and regulatory schemes differ greatly between countries, it is generally recognized that current healthcare systems are characterized by lack of transparency and inefficiencies and that digitalization of healthcare services can lead to improvements in quality, efficiency and accessibility of care.

We use the term “digital health” as an umbrella concept which subsumes eHealth, mobile or mHealth, telehealth or telemedicine, among others. Digital health can be defined as “an improvement in the way healthcare provision is conceived and delivered by healthcare providers through the use of information and communication technologies to monitor and improve the wellbeing and health of patients and to empower patients in the management of their health and that of their families” (Iyawa et al., 2016, p. 246).

The COVID-19 pandemic, in particular, has shown how much can be gained if health data were stored and processed digitally. A smart information system could even lead to

medical staff spending more time with patients and less on their PCs, for example, if information about patients were available seamlessly and the results of devices were transferred directly into their health records. Digitalization is actually a prerequisite of a patient-centered continuum of care model, which has been considered the gold standard by health experts for years.

Further, digital health services are available independently of time and location, encourage the empowerment of patients and enable shared decision-making. But although the benefits of digital health services such as better accessibility of care are widely recognized, there has been no large-scale integration into regular healthcare delivery. Rather, there is an abundance of successful pilot projects, which fail to be introduced into the regular healthcare delivery systems, i.e. the so-called ‘first healthcare market’, which includes reimbursable products, medicines and services.

We assume that this discrepancy between expected benefits and actual implementation is primarily due to the lack of viable business models. Such business models play an important role in establishing sustainable service platforms and promoting the uptake of digital health services by health providers and patients. The healthcare market is characterized by a complex multi-stakeholder environment, fragmented decision-making processes as well as a lack of incentives for cost-effectiveness (see e.g. Botti & Monda, 2020). Besides, healthcare products and services are heavily regulated.

The motto “Move fast and break things”, which tech companies use to describe the world as a playground for their creativity, does not fit hospitals. No advertising promise can be made without hard scientific evidence. Engineers in tech companies, on the other hand, are used to launching products early and then adjusting or stopping them. In medical technology, such an approach to product development would be unthinkable. Moreover, the development process has to be documented from the beginning according to official guidelines.

There are two main routes into the healthcare market for tech firms: 1) doing business with hospitals and healthcare

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✉ Edith Maier
edith.maier@ost.ch

Ulrich Reimer
ulrich.reimer@ost.ch

Nilmini Wickramasinghe
nilmini.work@gmail.com

¹ Eastern Switzerland University of Applied Sciences, St. Gallen, Switzerland

² Swinburne University of Technology and Epworth HealthCare, Hawthorn, Australia

companies or professions in the existing system; 2) use their various platforms to create entirely new channels through which medical care or preventive interventions can be delivered. Channels may include smartwatches that use machine learning algorithms for health monitoring, smartphones for use in clinical trials or apps that help people manage chronic conditions such as diabetes. However, this will only work if users can trust the devices and the channels through which medical data can flow.

Based on the technology and the services provided by tech firms, other companies such as health insurance or telecom companies, may enter the market with value-added services. However, the impact of digital technologies and associated services on the healthcare sector is not limited to the emergence of new players, but also concerns the changing roles of the various stakeholders.

Special issue papers

In this special issue of *Electronic Markets*, we can distinguish between two main categories of papers: those that relate to the relevance for and the use of digital health services by individuals and those that deal with economic and societal issues related to digital health services. Of course, the boundaries between the two are not that clear-cut, because a topic such as data protection, for instance, has regulatory and thus societal as well as individual aspects, e.g. people's concerns about the privacy of their health data. Although most people like using Google and Facebook, there is skepticism when these companies become active in the health sector. It is not hard to imagine that it would be a problem if personal health data fell into the wrong hands.

The papers take up different aspects related to digital health services and discuss new approaches that may improve or will change the interaction and communication between patients, doctors, and other stakeholders. We first present the papers that deal with the potential offered by digital health services for individual users followed by those papers that focus on economic and/or societal issues.

"Behavior change through wearables: the interplay between self-leadership and IT-based leadership" by Lehrer et al. (2021) points to physical inactivity as a global public health problem that poses health risks to individuals and imposes financial burdens on already strained healthcare systems. The authors argue that wearables such as smartwatches have great potential to encourage regular physical activity and a healthy diet. However, studies have shown ambivalent results regarding the effectiveness of wearables in improving users' health behavior. Therefore it is important to understand why some users change their behavior and others do not.

The authors conducted interviews with 50 long-term wearable users and analysed them on the basis of self-leadership theory. They have come to identify four use patterns that bring about different behavioral outcomes: following, ignoring, combining, and self-leading. Their study contributes to self-leadership research on individual health information systems and has practical implications for wearable and healthcare providers.

The article on "Understanding the evaluation of mHealth app features based on a cross-country Kano analysis" by Gimpel et al. (2021) also deals with mobile health solutions but focuses on the effects of specific mHealth app features on user satisfaction across different healthcare system contexts. Their study uses personal health record (PHR) apps as an example and investigates how potential users in Germany and Denmark evaluate a set of 26 app features taking into account four user characteristics, namely privacy concerns, mHealth literacy, mHealth self-efficacy, and adult playfulness. Based on survey data from both countries, they subsequently evaluate PHR features to understand the underlying relationships between user characteristics and user perceptions of features. For this purpose, they apply the Kano Model of Customer Satisfaction which classifies product attributes based on how they are perceived by customers and their effect on customer satisfaction. The results not only reveal significant differences between Germans and Danes with regard to fourteen of the features but also demonstrate which of the user characteristics best explain each of these differences. Thus, they are able to show how the Kano method can be extended in terms of explaining subgroup differences, which has implications for app providers and policymakers.

In "Understanding continued smartwatch usage: the role of emotional as well as health and fitness factors", Siepmann and Kowalczyk (2021) look at smartwatches, which are widely considered to be the most popular wearable devices. In recent years, the focus has shifted from finding out what makes people adopt a smartwatch to understanding factors that promote long-term usage. Based on self-determination theory, their study investigates the impact of a person's health and fitness as well as positive and negative emotional factors that may encourage or impede individuals to maintain the use of smartwatches over a longer period of time. To this end, the authors extend the expectation-confirmation model (ECM) to include emotional (device annoyance and enjoyment) as well as health and fitness factors (goal-pursuit motivation and self-quantification behavior). Based on 335 responses from actual smartwatch users, they then use structural equation modeling to validate the model. Results prove the applicability of the ECM to the smartwatch context and highlight the importance of self-quantification as a

crucial construct for explaining goal-pursuit motivation, perceived usefulness, confirmation and device annoyance. Not surprisingly, device annoyance proves to be an important barrier to continuous smartwatch use.

The paper by Fürstenau et al. (2021) on "Multi-sided platform and data-driven care research - A longitudinal case study on business model innovation for improving care in complex neurological diseases" combines two categories: on the one hand, the focus is on individualized care coordination for patients, on the other hand, it looks at complex platform business models that may enable such a continuum of care. In their longitudinal case study, the authors analyse the development of a platform for Amyotrophic Lateral Sclerosis, a severe neurological disease that requires the coordination of a diverse network of medical specialists, care and equipment providers as well as the active involvement of patients. The authors then establish two business models, namely, care coordination and care research. Whilst the former aims at improving patient care thereby creating immediate value for patients, the latter focuses on producing insights for long-term care improvements. The ongoing platform development carefully balances value generation for diverse stakeholders and economic sustainability.

"What to do after a data breach? Examining apology and compensation as response strategies for health service providers" is a paper written by Masuch et al. (2021) addresses the issue of sensitive customer information processed by health services. According to the authors, data breaches have become an everyday phenomenon. The challenge that health service providers face is to find effective recovery strategies after data breaches to retain customer trust and loyalty. They investigate how two widely applied recovery actions (apology and compensation) affect customer reactions after a data breach in the specific context of fitness trackers. Drawing on expectation confirmation theory, they argue that the recovery actions derived from apology and compensation lead to overall satisfaction with the recovery strategy, which in turn positively influences customers' attitudes and behavior. This is demonstrated based on data collected from fitness tracker users during a running event.

The paper published by Gleiss et al. (2021) can be assigned to the wider economic category. In "An apple a day – how the platform economy impacts value creation in the healthcare market", the authors confirm that the healthcare industry has been slow to adopt new technologies and practices. As pointed out before, the recent COVID-19 pandemic has shown the necessity of a fundamental digital transformation of the industry. But, the authors argue, whilst existing research may discuss the relevance of digital platforms in this process, they fail to examine their economic impact. They intend to fill this research gap by exploring how digi-

tal platforms might affect value creation with a particular focus on Google, Apple, Facebook, Amazon, and Microsoft (GAFAM). To this end, they examine how GAFAM platforms introduce new value-creating roles and mechanisms in healthcare through their many and diverse products and services. They then proceed to study the impact on healthcare by scrutinizing the facilitators, activities, and effects. Their analyses show how GAFAM platforms disrupt conventional relationships and transform value creation structures in the healthcare market.

The last paper to be presented provides an interesting example of a business model which is apparently not bound or restricted by the regulations normally faced by digital health services. The online service discussed by Wu et al. (2021) is a direct-to-consumer model with no intermediary involved. Patients or clients pay for the services out of their own pockets. In "How does service price influence patients' decisions? An examination of the free-market pricing mechanism in online health communities" the authors introduce the reader to online health communities (OHCs) in China, where physicians can provide online diagnostic services for which they apply free-market pricing. By collecting publicly available patient behavior data for three months from 7,726 physicians (with 154,512 records) on an OHC in China, the authors investigate the influence of service price on patients' decisions with regard to search strategy, purchase, review and review quality. As to be expected, scarcity of resources, the risk of disease or whether a physician treats mild or severe diseases affect a patient's purchase decision apart from the price of the service. To promote the continuous participation of physicians and patients, which is a prerequisite for the growth of an OHC, the authors suggest that the administrators of the OHC adopt a price recommendation system based on physicians' ability, popularity, reputation, medical title and other physicians' prices for comparable services. Uniform pricing as practiced in the traditional system cannot reflect the difference in service quality and the value of physicians, the authors argue. Besides, the pricing system should be dynamic and adjustable to service demand.

As can be seen from this brief overview, the papers included in this special issue raise a number of interesting questions with regard to possible business models and the future financing of digital healthcare services.

Implications for healthcare

The implications of the direct-to-consumer approach as presented by Wu et al. would be profound and fundamentally change the healthcare industry as it exists in most countries.

Whilst in the UK and most of Scandinavia healthcare is mainly financed by the government or its agencies through taxation and implies a single-payer system, in countries such as France, Germany, Belgium, Netherlands and Japan, healthcare is partly paid for by the government through taxes and employers' and citizens' insurance and involves a multi-payer system (Thomson et al., 2013). Providers of market-priced health services would probably encounter widespread reluctance or inability of patients to pay for digital health services.

While startups are hoping to compete on cost and choice, market-based financial considerations or choice may have a limited place in healthcare. If people are beset by a sudden health problem, they usually do not act like consumers. Even in a more market-based healthcare system as can be found in the US, where healthcare is paid for by employers and citizens, a different approach is currently pursued. In 2018, the Centers for Medicare and Medicaid Services introduced changes to the 2018 Medicare Physician Fee schedule which allows practitioners to seek separate reimbursement for certain digital health services such as remote monitoring (see Nixon & Gwilt, 2018). Unfortunately, such practices are not yet widely disseminated although Covid-19 may have not only accelerated the digital transformation of the healthcare system but also increased the willingness to pay for digital health services. For those interested in good healthcare at acceptable prices, it is therefore not bad news that tech companies are getting involved in this area.

But whilst it is true that big tech companies as well as many health startups have been moving into the healthcare industry, their quest to disrupt healthcare has proven to be exceedingly difficult. Google Health was discontinued in 2013; IBM Watson Health was discontinued in spring 2021. And to date Apple has emphasized wellness and prevention by focusing on exercise, meditation, and sleep rather than on more impactful medical applications aimed at addressing chronic diseases. Beyond proving their value to consumers, any tech company wanting to move into healthcare has a multitude of medical, ethical, and financial hurdles to overcome. Nevertheless, we consider it unlikely that medicine will undergo the kind of commodification that has already affected other industries such as transport or tourism. But traditional healthcare providers may well feel the pressure

to become more effective and less bureaucratic and to open up to the opportunities offered by digital health services.

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