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▶ The Rise of Digital Health

Four paradigm shifts accelerated by COVID-19 that will change healthcare for good

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Strategic Vision. Smart Implementation.

SUMMARY

COVID-19 has highlighted globally the drawbacks to low adoption of digital health technology. However, it has simultaneously demonstrated that there are plenty of opportunities for improvement. To leverage these opportunities, four paradigm shifts must be sustained even after the crisis subsides.

Paradigm shift 1
From face-to-face care delivery to virtual care at scale

By making healthcare more convenient for patients, who increasingly see healthcare as consumers, as well as serving regions with poor outpatient care and supporting individuals with mobility impairments, a hybrid model integrating remote or at-home care delivery would provide significant benefits well beyond the crisis.

Paradigm shift 2
From digital health for some to universal access

The extended awareness for and reach of digital health solutions triggered by the COVID-19 crisis will certainly gain momentum. It is now upon all players in the healthcare arena to develop easy-to-use digital solutions centered on the patient—including those who have less affinity for technology.

Paradigm shift 3
From fragmented consent to patient-controlled data sharing

In the future, successful players in digital health will build upon the increased willingness to share data and be transparent with patients about its use. For pharma, MedTech, and tech players, transparency will be key to maintaining this new attitude toward data sharing and justifying consumer trust.

Paradigm shift 4
From privacy versus security to mitigating the trade-off by design

The trade-off between security and privacy may never be completely eliminated. The technological challenge to the post-crisis world is therefore to create systems that mitigate its effects. These could include opt-in monitoring systems that are only "triggered" upon patient consent, which is revocable.

The Rise of Digital Health

Four paradigm shifts accelerated by the COVID-19 crisis that will change healthcare for good

With the COVID-19 patient count crossing the two million mark globally, the crisis has unveiled the pain points of healthcare systems around the globe. It has brutally highlighted the drawbacks to low adoption of digital health technology. However, it has simultaneously demonstrated that there are plenty of opportunities to catalyze a digital-driven change that will last beyond the crisis and improve healthcare for good.

To leverage these opportunities, four paradigm shifts materializing during the COVID-19 crisis must be sustained even after it subsides: First, care delivery has begun to center less on hospitals and traditional care providers and more on patients, providing the convenience of diagnosis and treatment at home whenever possible. Second, equitable access to care has become possible due to global interconnectivity that reaches across the digital divide to the world's most vulnerable populations. Third, patients are increasingly willing to share their health data for not only personal but societal ben-

efits thanks to a patient-centric approach to consent management. And finally, a compromise has been sought between the need for security and the rights to privacy, making privacy by design a key component of systems meant to ensure our medical security and health.

Maintaining these paradigm shifts beyond the crisis will help realize the benefits of digital health and its contribution to the quadruple aim of healthcare.
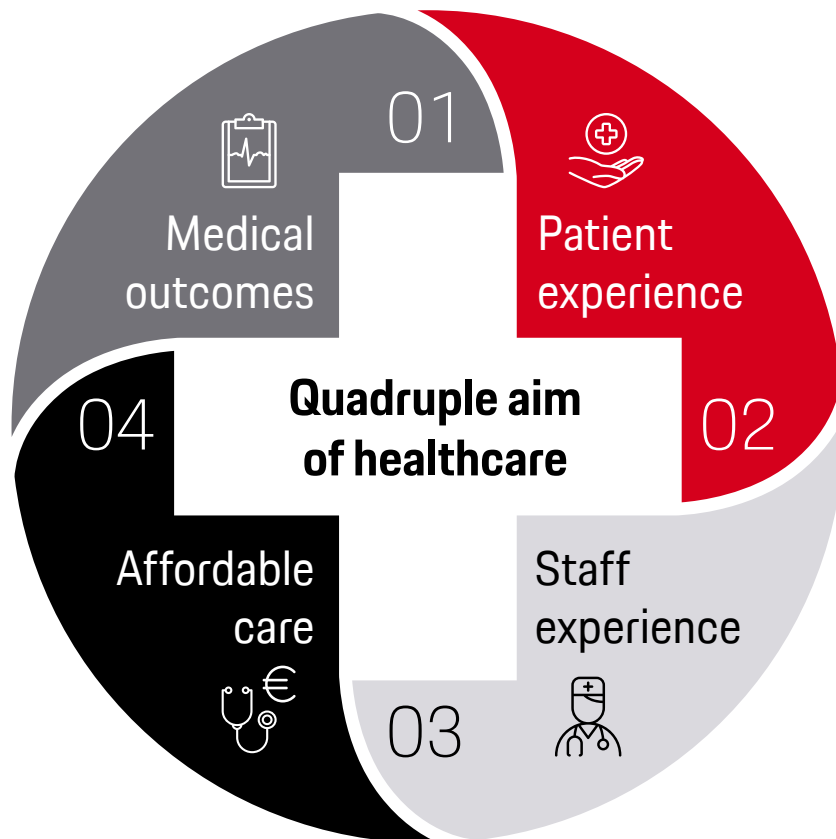
Source: Cerner   © Porsche Consulting

Figure 1. Quadruple aim of healthcare

Paradigm shift 1

From face-to-face care delivery to virtual care at scale

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From face-to-face care delivery to virtual care at scale

Healthcare systems still revolve today around brick-and-mortar care delivery in hospitals and physical clinics. Only a small fraction of care, in the low single-digit range, is actually delivered at home and mostly for long-term care. At the start of the nineteenth century over 50 percent of healthcare was delivered at home while today in the US less than 1 percent of care delivery happens in the patients' homes.[1] COVID-19 has highlighted both the risks of close physical interaction between patients and clinicians and the opportunities of virtual care for a large group of patients.[2]

In the course of the current crisis, virtual care applications such as web- or app-based triage bots (e.g., Ada Health) and telehealth applications (e.g., TeleClinic) have gained significant traction. They can significantly free up healthcare provider resources, are easily scalable, and improve the routing of patients based on providers' free capacities and skills. Automated triage and symptom checkers help keep people away from hospitals and care facilities overflowing with infectious patients, thus helping to break infection chains. In many cases, tele-consultations can replace a physical meeting between doctors and patients. Providers such as KRY, the market leader in Scandinavia that has begun serving patients in Germany, reported a spike of more than 200 percent in the number of video consultation services compared to the last week of March 2020. Other players like RED Medical are reporting a veritable onslaught of requests for tele-consultations, with the number of registered psychotherapists jumping from 800 to over 26,000 and the count of sessions from 4,800 to 260,000 in March alone. Platforms like sprechstunde.online by Deutsche Arzt AG have expanded their consultation services to other medical professions such as physiotherapists.[3]

Beyond areas of healthcare directly related to COVID-19, virtual care solutions tailored to times of mass quarantine have recently gained momentum: digital rehabilitation (e.g., Caspar Health or Kaia Health), mental care (e.g., HelloBetter or Selfapy), and solutions during pregnancy (Keleya or Kinderheldin), to name just a few.

Babylon Health is an example of a comprehensive approach to the future of patient-centric healthcare delivery. The London-based health service provider started out offering remote consultations with doctors and healthcare professionals via text and video messaging over its mobile application. After the largest-ever funding round for digital health delivery in Europe and the US in August 2019—US$550 million—Babylon entered a ten-year contract with NHS Wolverhampton in January 2020. The long-term contract aims at developing a new model of digital-first, patient-centric integrated care that will connect primary, secondary, and community care.[4]

Chronic diseases are a key application area for digital health solutions built around patients and healthcare provider journeys. Remote monitoring and patient companion solutions help identify and better address the needs of patients with indications such as diabetes, mental disorders, and cardiovascular and oncological diseases. Pharma and MedTech players are seeking to harness the potential of digital health solutions built around their core products.

It seems that virtual care solutions are here to stay. After experiencing the benefits of remote interaction in healthcare delivery, it is hard to imagine patients and care professionals returning to the traditional face-to-face approach. By making healthcare more convenient for patients, who increasingly see healthcare as consumers, as well as serving regions with poor outpatient care and supporting individuals with mobility impairments, a hybrid model integrating remote or at-home care delivery would provide significant benefits well beyond the crisis.

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[1] See 121: Coronavirus Outbreak," January 29, 2020, in 16 Minutes on the News, a16z, podcast, https://a16z.com/2020/01/29/16mins-news-coronavirus-outbreak-2019ncov-r0-genomics-epidemics/.

[2] Sirina Keesara, Andea Jonas, and Kevin Schulman: "COVID-19 and Health Care's Digital Revolution," New England Journal of Medicine, April 2, 2020, https://doi.org/10.1056/NEJMp2005835.

[3] For more details and examples, see Henrik Matthies, "Here to stay: Digital health in times of COVID-19. A German deep-dive," Health Innovation Hub, accessed April 13, 2020, https://hih-2025.de/here-to-stay-digital-health-in-times-of-covid-19-a-german-deep-dive/.

[4] The app-based platform will not only provide tele-consultations for patients, but also cover live monitoring of patients with chronic conditions, integrating wearables and other monitoring applications, and connect patients with doctors and other healthcare and rehabilitation professionals. Patient-centric services bill also enable patients to access their own medical records, review their consultations, book appointments, or renew prescriptions, and manage their rehab after a procedure, illness, or injury. See Ingrid Lunden, "Babylon Health is building an integrated AI-based health app to serve a city of 300k in England," Tech Crunch, January 23, 2020, https://techcrunch.com/2020/01/22/babylon-health-is-building-an-integrated-ai-based-health-app-to-serve-a-city-of-300k-in-england/.
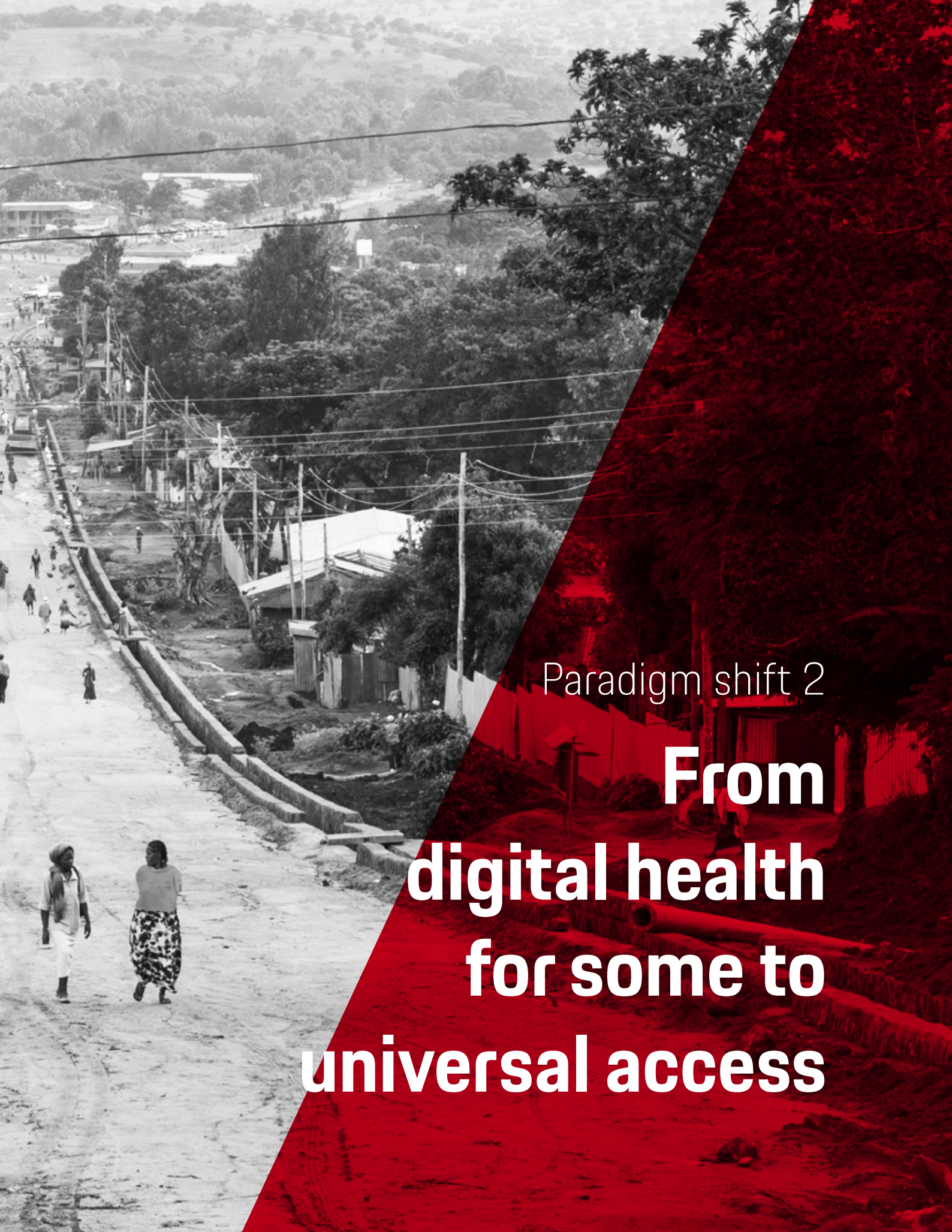
Paradigm shift 2

From digital health for some to universal access

Paradigm shift 2
From digital health for some to universal access

Nothing reminds us of our planet's interconnectedness like a global crisis that cannot be contained: across countries, socioeconomic divides, cultures, and age groups, the crisis is impacting everyone. National healthcare systems throughout Europe generally allocate resources equitably among their populations. With regards to digital health solutions, however, a digital divide persists. This is true mainly for the elderly, the poor, and the uneducated.

Unfortunately, these are the same groups most likely to suffer from poor health or preconditions that make them particularly vulnerable to epidemics. With today's care focused on brick-and-mortar delivery, healthcare systems essentially make these populations choose between exposing themselves to infection risks when visiting healthcare facilities or postponing care.

While we observe digital healthcare solutions built around the continuum of care for chronic indications, a similar approach to scale digital care delivery for entire populations is in its infancy. Leading the way are countries like Rwanda, which joined forces with the aforementioned Babylon Health as early as 10 years ago. With a shared ambition to provide universal primary care, they are building a platform that allows people over the age of 12 to consult with a doctor or nurse within minutes on their phone. Patients are able to receive prescriptions, lab requests, and referrals via their smartphones, which means greater control over their own health, faster treatment, and fewer trips to health facilities. Every consultation will be paid for through the government's community-based health insurance scheme. By now an already rolled out service of Babylon in Rwanda has more than two million registered users and has delivered over one million consultations, with 3,000 more occurring every day.[5]

Payers and policy makers will have a significant say in making such holistic digital approaches a reality in more countries and ensuring universal access. The extended awareness for and reach of digital health solutions triggered by the COVID-19 crisis will certainly add momentum to this development. It is now upon all players in the healthcare arena to assume more social responsibility and develop easy-to-use digital solutions centered on the patient—including those who have less affinity for or access to technology.

[5] See "Rwanda's ambitious aims for digital health," Healthcare in Europe, March 6, 2020, https://healthcare-in-europe.com/en/news/rwanda-s-ambitious-aims-for-digital-health.html.

Paradigm shift 3

From fragmented consent to patient-controlled data sharing

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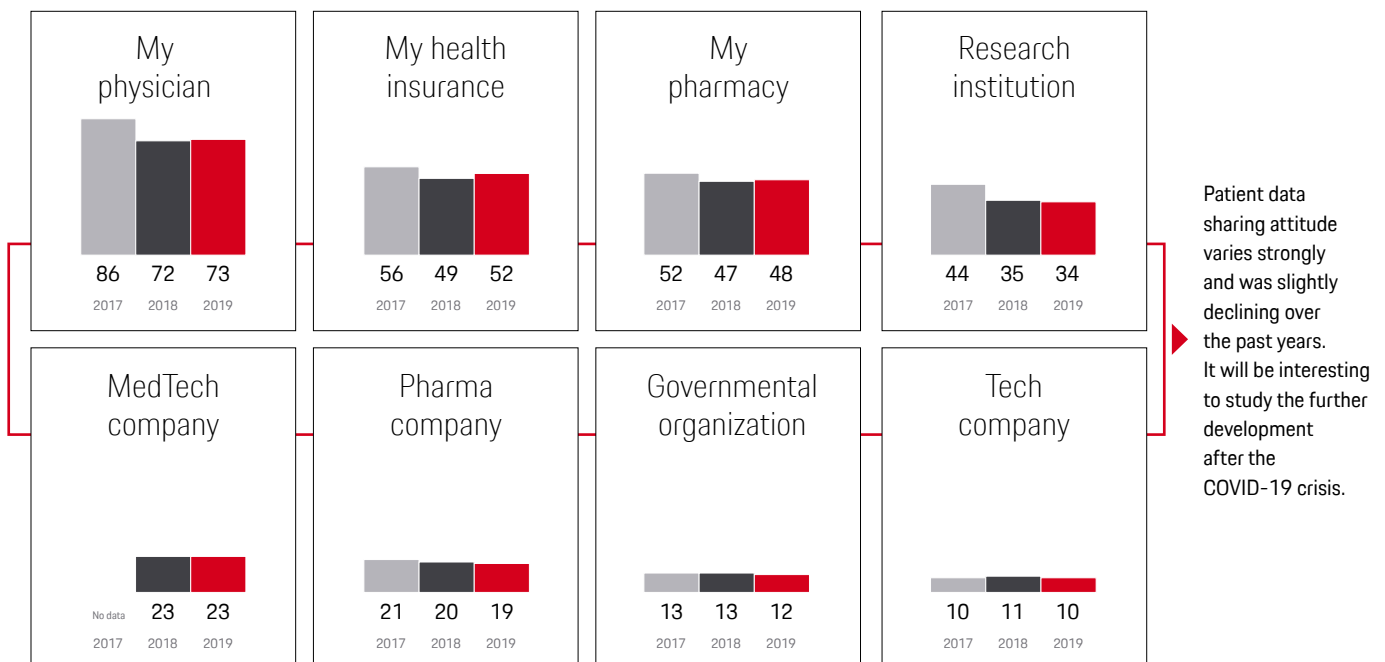
Sharing health data can provide a better evidence basis for the development of drugs, medical devices, and digital health applications, ultimately improving clinical and patient-reported outcomes.

While patients' awareness of the value of their data and their willingness to share it was already high among patient communities with rare or chronic diseases[6], the COVID-19 crisis may be a pivotal moment to change the prevailing paradigm regarding data sharing across a much broader population. The growing perception that data can unlock value not only for personal health but for that of the population, as a benefit to society, may help change attitudes toward data sharing. The Corona Datenspende app from the Robert Koch Institute

in Germany, for instance, skyrocketed to the top of the app store charts with more than 50,000 downloads in less than 24 hours.[7]

In the future, successful players in digital health will build upon this increased willingness to share data and be transparent with patients about its use. For pharma, MedTech, and tech players, transparency will be key to maintaining this new attitude toward data sharing and justifying consumer trust. It remains to be seen how fast the fragmented approach to managing consent to data use is replaced by a more unified one, built around consumer needs: that is, managing health data conveniently in one digital interface with a maximum of transparency and perceived control over its use.

I am willing to share my health information with …

	My physician	My health insurance	My pharmacy	Research institution
2017	86	56	52	44
2018	72	49	47	35
2019	73	52	48	34

	MedTech company	Pharma company	Governmental organization	Tech company
2017	No data	21	13	10
2018	23	20	13	11
2019	23	19	12	10

Patient data sharing attitude varies strongly and was slightly declining over the past years. It will be interesting to study the further development after the COVID-19 crisis.

Source: Stanford Center for Digital Health & Rock Health

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Figure 2. Willingness to share health information (in percent, 2017–2019)

[6] The willingness to share personal health information exceeds 90 percent among European patients with rare diseases when asked about application in several areas, such as using data to better understand a disease, develop therapies, improve diagnostics, or improved care for other diseases. See Sandra Courbier, Rebecca Dimond, and Virginie Bros-Facer, "Share and protect our health data," Journal of Rare Diseases, 2019, 14, https://doi.org/10.1186/s13023-019-1123-4.

[7] App users donate anonymized vital data collected by their smartwatches or fitness trackers in an effort to help researchers gain a better understanding of the geographic spread of the disease. For more details, see https://corona-datenspende.de.

Paradigm shift 4

From privacy vs. security to mitigating the trade-off by design

Paradigm shift 4

From privacy versus security to mitigating the trade-off by design

The COVID-19 crisis has brought the long-standing debate about patient privacy versus community health security into the spotlight. These two goals, both of which offer significant benefits to society, have long been perceived in opposition to each other.[8] Although people value privacy, most understand the necessity of sacrificing some of it to achieve security. Countries and societies understand this trade-off differently, however.

COVID-19's epidemiology highlights the advantage of tracking the physical movements of patients who have tested positive for the virus. In particular, the virus's long, asymptomatic incubation period during which patients are infectious makes it necessary to trace everyone with whom they had contact during the 14 days prior to diagnosis (the upper limit for this incubation period).

In some countries, such as Israel, the government has allowed security agencies to trace GPS signals from private mobile phones.[9] When citizens are diagnosed positive for COVID-19, their movements during the previous 14 days are examined in order to alert others who are at risk through contact and require them to self-quarantine for two weeks. While this system makes sense in terms of community health security, it bears the potential for civil rights abuse.

The trade-off between security and privacy may never be completely eliminated. The technological challenge to the post-crisis world is therefore to create systems that mitigate its effects. These could include opt-in monitoring systems that are only "triggered" upon patient consent, which is revocable. Other fully GDPR-compliant solutions are in development, such as the often-cited efforts of the Fraunhofer Heinrich Hertz Institute to build a corona-tracking app as part of the Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT) initiative. This technology, already successfully leveraged by Singapore's TraceTogether, does not rely on potentially sensitive geolocation data and ensure data privacy by design.[10]

There is a great opportunity here for European entrepreneurs and innovators to devise novel systems that address the European sensitivity about data privacy and embed it into the design. Rather than perceiving it as a burden, creating the required technological advances to address the European approach to data privacy will establish a competitive advantage over other solution providers from less privacy-minded countries.

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[8] Chris Strohm, "Privacy vs. Security," Bloomberg, June 6, 2017, https://www.bloomberg.com/quicktake/privacy-vs-security.

[9] Natasha Lomas, "Israel passes emergency law to use mobile data for COVID-19 contact tracing," Tech Crunch, March 18, 2020, https://techcrunch.com/2020/03/18/israel-passes-emergency-law-to-use-mobile-data-for-covid-19-contact-tracing/

[10] For details, see Christiane Schulzki-Haddouti, "Heinrich-Hertz-Institut: Europäische Corona-Tracking-App in Entwicklung," April 1, 2020, https://www.heise.de/newsticker/meldung/Heinrich-Hertz-Institut-Europaeische-Corona-Tracking-App-in-Entwicklung-4694736.html (in German).

RESOLVING THE DICHOTOMY BETWEEN DIGITAL AND ANALOG CARE

Looking at the four paradigm shifts, it is clear that digital and analog care delivery can no longer be built in silos, but rather form two pillars of a unified approach. It is of paramount importance to make digital layers an integral part of modern, hybrid care delivery, focusing on improving care delivery for patients and decreasing transaction costs in our healthcare systems. This means leveraging the strengths of digital solutions while retaining a human touch, even using technology to help doctors and care staff foster a more intimate relationship with their patients. All stakeholders—healthcare providers, MedTech and pharma companies, digital health startups, as well as payers, and policymakers—must work together closely to make this the new reality. The COVID-19 crisis might serve as a key catalyst on this path. But only through collaboration can these paradigm shifts become sustainable and bring long-lasting benefits for digital health and healthcare in general.
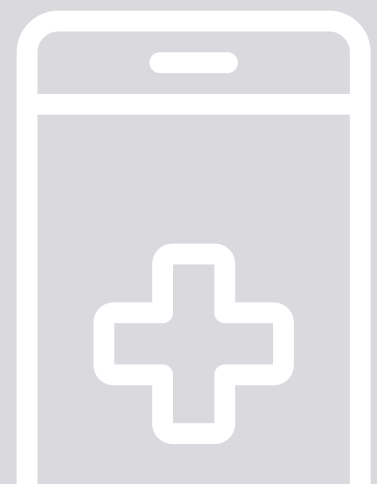
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APX is an early-stage startup investor and accelerator in Berlin backed by Axel Springer and Porsche. Investing across sectors, APX is looking for ambitious founding teams with scalable, digital ideas, and global aspirations to support these teams in becoming successful venture companies. Since 2018, APX has invested in more than 50 companies from 20 different countries together with more than 100 co-investors. In January 2020, APX started its Digital Health Initiative to help bridge the gap between innovation and commercialization in digital health in Berlin, and more broadly, Germany.

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