

# Unleashing the power of digital health through ecosystems





## Digital health ecosystems

Abstract: Digital health is a revolution. It places the focus firmly on patients and empowers them to manage their health, as well as enabling several actors to use new sources of data, e.g., to personalize treatments and medicines. COVID-19 has pushed the development of digital health to new spheres, but despite an estimated potential of more than EUR 100 billion in the EU, no sustainable business model exists for innovators so far. An ecosystem approach to connecting various actors in the health system would address that gap, benefiting: (1) **patients**, as digital offerings would have higher relevance and value along the full patient journey; (2) **providers**, who would receive access to novel insights and combined digital and non-digital care offerings from linked data sources; (3) **start-ups**, as there would be better opportunities to tailor their offerings and reach patients on a larger scale; (4) **pharma companies**, in finding the best participants for clinical trials; and (5) **payers**, as they would have more effective steering, higher interaction efficiency, and better service delivery.

# Unleashing the power of digital health through ecosystems

by Ulrike Deetjen, Stefan Biesdorf, Giovanni Giuliani, and Walter Oberhänkli

Digital health is revolutionizing the way we think about healthcare – it places the focus firmly on patients and empowers them to track, manage, and improve their treatment, making them more informed, independent, and demanding. Moreover, digital health data enables healthcare providers to tailor solutions by personalizing treatments and medicines, and offers a tantalizing look into the future of medical care. The increased demand for digital health services during the COVID 19-induced lockdowns have made this vision of a potential future even clearer. Yet so far, enabling scalable, interconnected digital health services has proved a hard nut to crack.

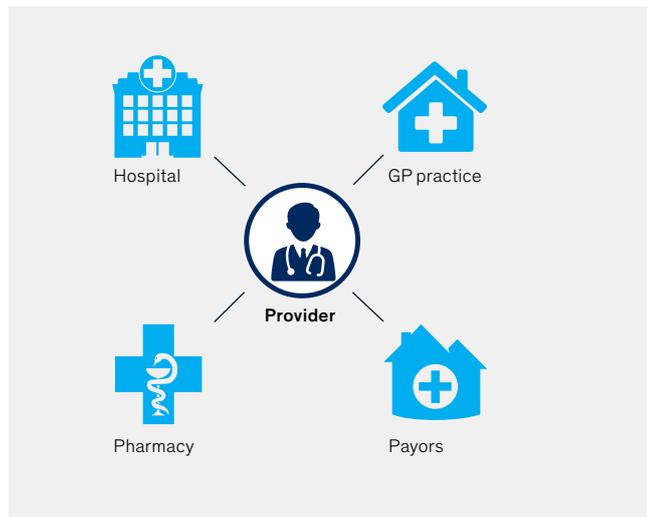
This article explores what it takes to unleash the full power of digital health to the benefit of patients, payers, and providers alike. It describes the burgeoning digital health trend and its potential across European countries, the execution challenges it faces, and the kind of ecosystem it needs for unleashing its full potential. It concludes with ideas on how to establish that ecosystem across countries.

## The rise of digital health

Digital health is the face of 21st century wellness. The convergence of information, technology,

## E-health and digital health

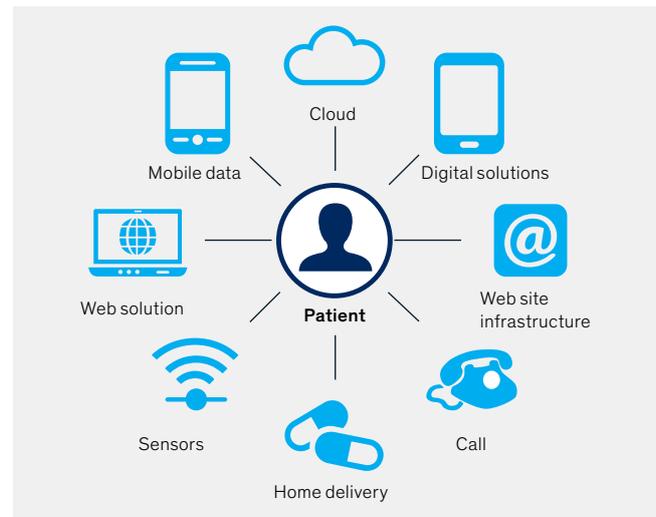
**E-health:** centred around the provider



### National e-Health programs

- Nationally focussed
- Low perceived benefits for providers
- Limited competition
- Fragmented IT
- Change resistance

**Digital health:** centred around the patient



### Digital health transcends national borders

- Global scale
- Intrinsic interest in connecting
- Winner-takes-all logic
- Modern IT
- No natural owner

people, and connectivity will improve health outcomes for patients and increase efficiency for healthcare professionals. We distinguish between “e-health” (centred around the healthcare professional, e.g., electronic medical records (EMRs), giving clinical decision support) and the more recent development of “digital health” (centred around the patient, e.g., health apps for self-management of chronic conditions). Exhibit 1 shows these different concepts.

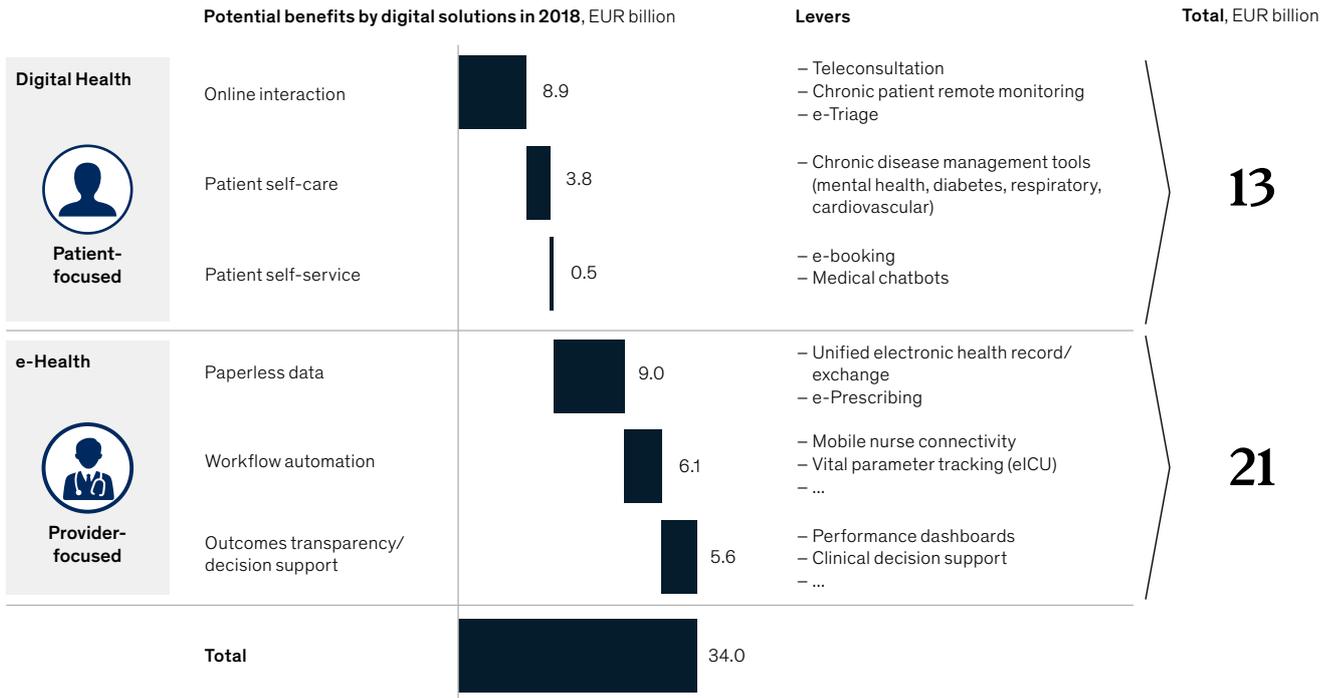
Digital health players and new entrants are flooding the market with new, improved solutions. In 2018 alone, users could access more than 250,000 health apps on fitness/wellness, disease prevention/management, specific conditions, medical records management, and interactions with health service providers, etc. in iOS/Android app stores. These digital services are convenient (easy to use, whenever and wherever) and familiar, as people are now accustomed to using them for other purposes, e.g., banking.

As digital offers grow in number and sophistication, users are taking them up, provided that they meet security and privacy requirements – which can be challenging in a rather fragmented landscape of solutions of different quality and suitability for individual

needs. However, users also respond to external circumstances: During the COVID 19 pandemic, user interest in digital health applications such as telemedicine has surged. In mid-March, within one week downloads increased by more than 400 percent in Germany and nearly 1,000 percent in France. While this sharp increase in digital usage has reached a level that is unlikely to be sustainable once “normal” life resumes, the combination of a higher interest in health topics, restrictions in offline health services, and the subsequent temporary lifting of volume and other restrictions on reimbursement of telemedical services have contributed substantially to the advancement of digital health.

Digital health potential is estimated at more than EUR 100 billion in the EU. Between 5 and 10 percent of a country’s health spending could be saved through better access to care, better adherence, or more efficient triage between care settings, for example. In Germany alone, this potential amounts to EUR 34 billion, one third of which is centred around the patient (discounting the costs for realizing this benefit (Exhibit 2)). This finding is based on our scientific review of over 500 academic papers and interviews with experts from different sectors of the health system.

## Huge benefits through both e-health and digital health (Germany)



Payers and providers are benefitting from developments in digital health to different extents. Contrary to a 2006 analysis by the German telemedicine agency Gematik, which found that nearly 80 percent of the value accrued to payers and only 20 percent to providers, our analysis from 2018 revealed that approximately 70 percent of value was realized by providers through increased efficiency and focus on high-value activities, partially stemming from better use of data from claims and EMR data (Exhibit 3). The introduction of EMRs and e-prescriptions is the most important lever for this, and acts as a crucial enabler for all other levers.

However, the costs for bringing healthcare innovation to life need to be added to the equation. Creating digital health applications and making them available to patients incurs costs for those providing the infrastructure, creating or managing applications, and providing medical expertise, not to mention the ancillary costs for marketing, legal issues, and data protection. To pay for this, generated value and incentives need to be aligned.

To date, however, few if any digital health solutions receive regular reimbursement from public health systems, and alternative sustainable and adequate revenue streams are hardly available. Important first steps have been made, e.g., with the Digital Care

Act coming into place in Germany in 2020. In short, this law suggests new ways of prescribing apps and financing them through payers based on actual benefit to the patient. However, digital health is still far from realizing its full potential.

### Challenges in digital health

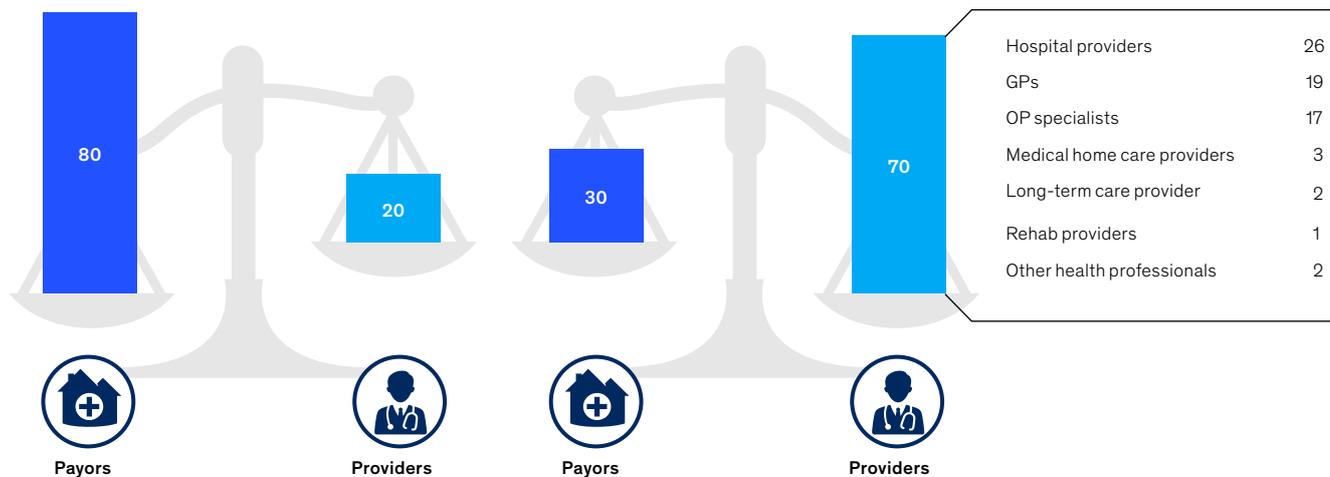
There are various reasons why innovation laggards continue to dominate digital healthcare and digital health innovation has still not taken off:

- **There is no sustainable business model for innovators.** Digital health players cannot create a thriving and sustainable business model from patient-generated revenues via sales in app stores. That said, alternative sources of revenue are only starting to become available for app providers, as the first payers are beginning to pay for solutions. In Germany, for example, the Tinnitracks app offers two types of therapy to help patients who suffer from tinnitus. After an ENT prescribes the app, most payers reimburse the costs. However, this model at least partially lags because of existing incentive structures in activity-based reimbursement programs.
- **It is difficult to estimate the value for the health system.** If patients manage their

## Payors and providers benefit from digital health/e-health

**Gematik study (2006): Value capture by payors and providers, percent**

**New study (2018): Share of EUR 34 billion that resides with payors and providers, percent**



diabetes via an app, how does this impact health outcomes or expenditure? To answer this question, activity data (or “input data”) from digital health apps would have to be linked to outcome data from the health system to evaluate the actual value generated – both in terms of patient well-being and system efficiency. So far, no effective methods for this evaluation or on how to link it to new ways of reimbursement are available.

- **Start-ups struggle to capture the full value.** Start-ups typically create point solutions for specific patient needs. They build mobile apps that meet a single need, are easy to understand, and offer “specialized stand-alone services.” But since they are not integrated into the traditional care delivery system, they cannot realize the full value for either the patient (personalized, specific recommendations) or the health system (cost reduction or quality improvement).
- **Health market dynamics are very complex.** A “killer app” may not be enough to change behavior in the healthcare space, i.e., technology innovation alone is not sufficient to convert users. In other markets, such as travel, users prefer apps that provide optimal user experiences; in the health market, patients are much harder to engage until they know that an app will truly impact their lives in a positive way.
- **Data sources are disparate and**

**disconnected.** Providers have not yet understood how to bring data and information onto one platform so that they can use them to improve patient outcomes in a measurable way. At the same time, players are reluctant to share their data: e-health players have no embedded incentive to share their data with digital health players.

All players must be engaged and see a benefit in digital health applications. Patients need curated services/apps and the knowledge that their engagement makes a difference. Providers and medical practitioners need to integrate these applications into workflows that create value for them, e.g., through better patient adherence. And payers have to incentivize both sides to use these applications in order to reduce health costs and offer better services to their members.

Therefore, the relevant question is: What will it take to overcome these challenges and unlock the full potential of digital health?

### Enabling digital health through the ecosystem

Many sectors experienced drastic change when new, platform-based ecosystem players emerged. The retail, travel and transport, and media industries look very different than they did ten years ago; change has been driven by large and globally active digital champions. In the healthcare industry, however, no digital champion has emerged yet.

The key to truly unlocking the power of digital health lies in ecosystem approaches that connect different services and solutions into seamless patient journeys. Ecosystems bring together medical data (from the health system) and patient-generated data (from digital health applications). Connecting disparate technology components and data sources enables a powerful patient offer and makes the healthcare system function better. In addition, bringing together these data sources offers new ways of evaluating performance and outcomes, with opportunities for completely new reimbursement paradigms.

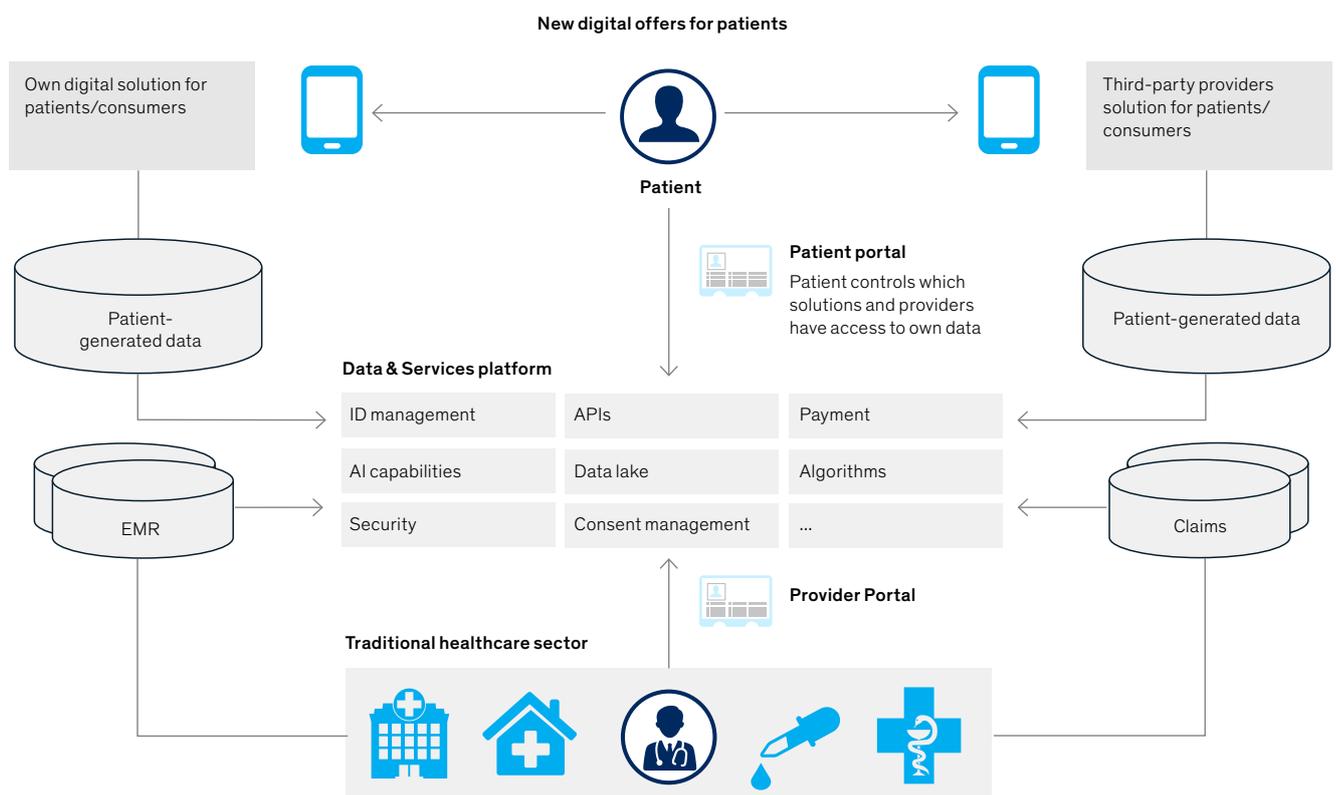
Ecosystem approaches help integrate digital health solutions into the existing infrastructure in two important ways (Exhibit 4). First, a central platform with standard data management functions including patient authentication and data privacy, prepopulated with data from the health system (e.g., claims data), and single sign-on across solutions could help creators of digital health applications provide a more contextually relevant experience for the patient. This is the principle of contextual deep linking, where customers are forwarded from one app to another while preserving the context of the interaction. Second, patient-generated data fed back into

the health system would improve integrated care delivery and system navigation and could be combined to evaluate the effectiveness of specific interventions.

Ecosystems create value for all participants in the traditional healthcare sector: they deliver value for patients by enhancing services and convenience by providing stand-alone or seamlessly integrated digital offerings along the patient journey. They deliver value for insurers by directing patients towards the best treatment option. And they deliver value for all other participants by increasing transparency and efficiency to maximize overall value for the system rather than for individuals (as created by activity-based reimbursement programs, for example).

The key to success is patient engagement: the patient needs to be placed at the heart of the solution. An ecosystem will only function if patients trust it, experience a superior benefit, and understand the value of sharing their data and engaging with the offers. The patient as fulcrum helps align incentives, as data sharing becomes mutually beneficial: A patient agreeing to share their data also receives the related benefits – and that in turn increases demand from physicians

Exhibit 4  
**Target picture for health ecosystem**



and providers more generally, as has been seen in the developments during COVID 19. A system that does not revolve around the patient will fail – as will a system that only captures value for some of the involved parties rather than creating balanced incentives for everyone.

### Designing the right ecosystem

For a digital health ecosystem to come into existence, certain critical design elements need to be combined. It needs an orchestrator to combine different data sources and occupy a central position. It also needs to be clear what value is generated for each of the parties involved in order to align incentives.

“Each involved ecosystem participant will benefit from the future health ecosystem”

### What is needed to establish the ecosystem?

Founding an ecosystem requires basic infrastructure that allows different parties to exchange data, enabled by a trusted party. At its very core, such an ecosystem should consist of a patient-centric gateway with basic functionalities in partner management, such as authentication and authorization. Furthermore, it should contain digital health solutions with standardized, externally documented application programming interfaces (APIs) that allow ecosystem partners to integrate with little effort, and standard workflows for doing so – across both the digital and physical worlds.

Built for scalability (e.g., by using medical cloud functionality and scalable IT foundations such as containerization), the basics are sufficient to start and grow the ecosystem through the dynamics of two-sided markets: A larger number of offers from partners attracts new patients, more patients in turn attract a larger number of partners offering their services, etc. – as ecosystems grow, the winner will take it all.

Finally, at the next stage of evolution, further services (such as analytics) may be integrated into the ecosystem foundations. This would allow for even better targeting of patients with relevant offers, understanding of data (e.g., as a basis for clinical trials), or evaluation of the effectiveness of digital health interventions, which forms the basis for enabling sustainable business models for start-ups.

### What design choices need to be made?

Three principle elements should be considered for designing an ecosystem: value in use cases, openness of the system, and potential data sources (Exhibit 5).

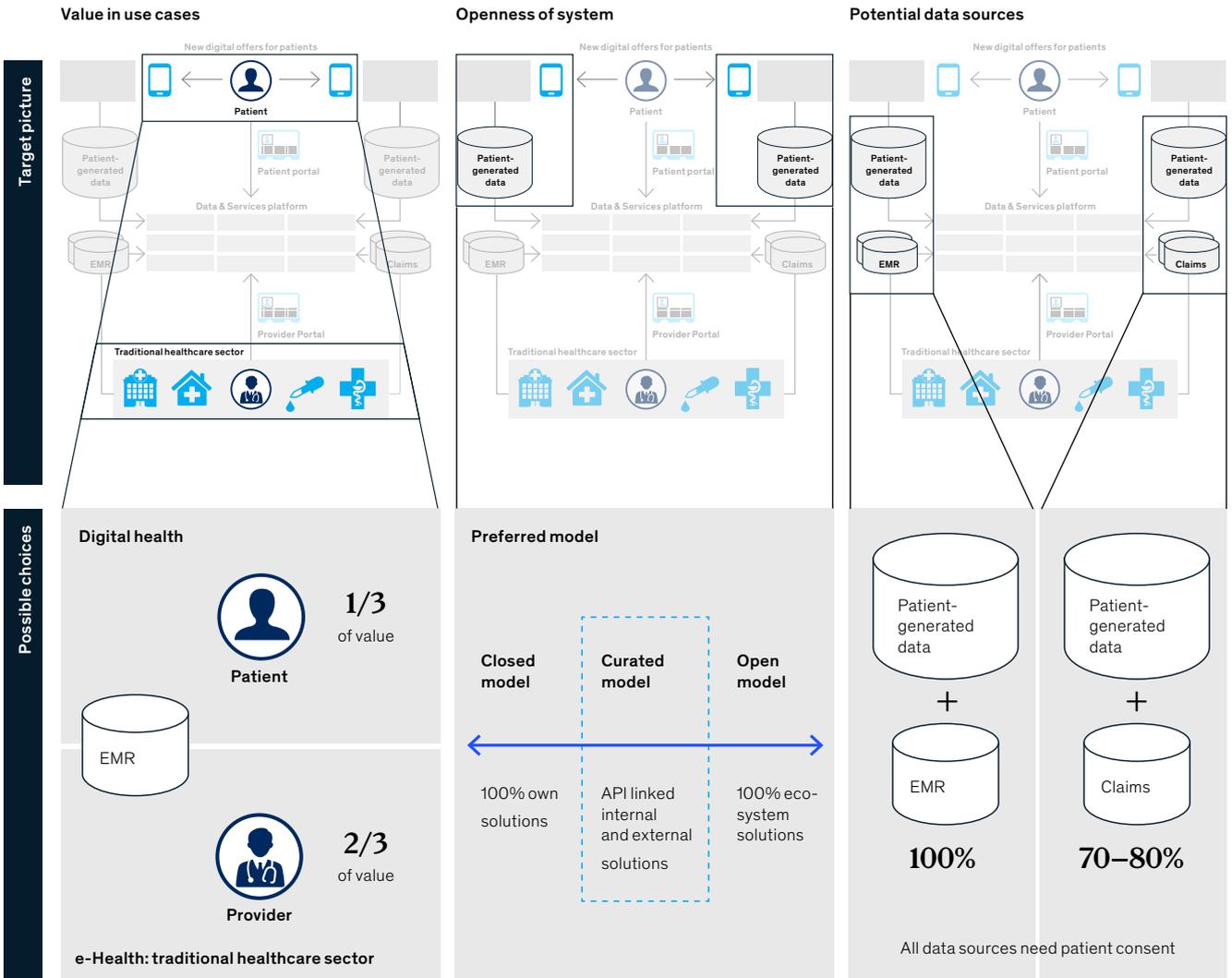
- **Value in use cases.** Customer-facing applications generate one-third of the value created in digital health by reducing demand for services. Efficiency gains account for the remaining two-thirds of the value (classic e health). Customer-facing applications are therefore important to build momentum but should then merge with traditional care delivery into a hybrid model to realize their full value.
- **Openness of the system.** Neither fully closed (proprietary applications) nor fully open models work. Closed ecosystems can lack scalability and innovation as they may not cover the full range of patient needs. Open ecosystems may face reputation and trust issues. The solution is therefore a system that curates offers without creating app certification bottlenecks.
- **Potential data sources.** To incentivize start-ups to join this ecosystem and combine patient activity and outcome data for evaluation purposes, the system must integrate data from the legacy health system. Claims data are a good place to start, as they are widely available and well structured. Similarly, EMR data offer very valuable insights.

### Who uses the data?

Data may be used by a variety of players, e.g., patients, providers, start-ups, pharma companies, and payers.

In terms of digital health ecosystems, **patients** benefit from using integrated services with higher relevance and value. This is due to existing data being used to personalize the digital offer and support the dialogue with health professionals on data collected in everyday life, outside of the medical system.

Exhibit 5  
**Critical design choices for ecosystems**



**Providers** benefit for the same reason – provided that analytical capabilities really support insights rather than just data collection, and that reimbursement models incentivize the use of digital health innovations.

**Start-ups** benefit from gaining access to data from the health system, e.g., on claims. They can use this data to better tailor their offers, and by bringing together activity and outcomes data they can evaluate the usefulness of their digital health innovation. Of course, this relies on the prerequisite of patient consent – and the real benefit of this is only created once reimbursement programs enable payers to select start-ups on that basis and link payment to actual impact on the health system.

Likewise, **pharma companies** may also benefit from increased access to health system data.

This way, they can find the right participants for clinical trials and develop new drugs by using data from outside the health system (for mental health, dementia, certain types of cancer, and other conditions with a high share of behavioral influencing factors, etc.). Furthermore, they can present real-world evidence of how drugs impact health outcomes or even personalize approaches for treatment to improve healthcare in the future.

Finally, **payers** benefit from ecosystems in various ways. By integrating digital health solutions, they can deliver better services to their members (thereby increasing customer retention rates), steer patients through the system more effectively, and increase interaction efficiency. Each of these benefits helps reduce costs, and ultimately leads to a better, more efficient health system.

## Becoming an ecosystem leader

Ecosystems need orchestrators who create the infrastructure to tie everything together. Successful players will integrate tangible and intangible assets into one seamless solution. Tangible assets include the ability to engage patients, the analytical skills to collate and analyze disparate data sets, and a technology platform that brings together players seamlessly in the ecosystem – often in conjunction with a patient-centric EMR as a basis. Intangible assets include experience in creating an ecosystem, intellectual property and know-how in the health space, and the power of partnerships between players that bring different sets of unique skills to the table.

Payers would be natural orchestrators because they benefit from ecosystems in various ways. By integrating digital health solutions, they can deliver better service to their members, steer patients more effectively, and increase interaction efficiency. Each of these benefits helps reduce costs, particularly in systems where payers also set up the EMR. This is the case in Germany, where several payers are developing their own interoperable solutions (e.g., Vivvy, TK with TK-Safe, AOK) and where recent regulatory changes are supporting the development of these solutions, for example, the Digital Care Act that encourages the adoption of digital health services and outcomes-based reimbursement.

At the other extreme, large US technology players such as Google, Apple, and Amazon are well positioned to set up digital health ecosystems due to their technological capabilities and closeness to the patient via services within, and especially outside, the health system. While current EU regulation limits the possibilities for these players, particularly in terms of integration into the health system, their ability to use existing infrastructure and provide services with superior user experience should not be underestimated.

In a next step, specific measures should be defined to help countries take up digital health opportunities while ensuring – given the cross-national nature of digital health – that innovation can scale up across country borders. To this end, the EU could invest in a basic technical infrastructure that allows digital health solutions to refer patients and their data from one solution to the next. Following on from this, a “hybrid health system” could be launched by enabling patients and their data to be referred to healthcare providers in the traditional health system.

Core elements of the technical infrastructure include identity management for patients and solution providers, encrypted data transfer, patient consent functionality, and the logging of referrals and data transfer. High security standards are a must. There is no need to store data on the technical infrastructure: It should only use the infrastructure to “travel” between digital solutions, thus making data theft less likely, and should build on local infrastructure in each member state.

This opportunity needs to be seized now – a wait-and-see strategy is not an option. COVID 19 will fundamentally shape the (digital) health system over the years to come. Health players should act sooner rather than later and consider developing platforms to enable data sharing in the health system. By doing so, they can enable innovators to build sustainable business models while acting as a central gatekeeper in the system and maintaining control over data.

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