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Driving the future of health

How biopharma can defend and grow its business in an era of digitally enabled healthcare

#FutureOfHealth

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Executive summary

By 2030, healthcare will be centered on patients empowered to prevent diseases rather than seek treatment. They will receive personalized health solutions in ways that are integrated seamlessly into their daily lives. All of this will be enabled by data and algorithms and provided within a healthcare system that is organized and regulated in an entirely new way.

This shift will require transformation in every part of the existing healthcare system. Physicians and caregivers will need to redefine their roles; regulators will have to create acceptable frameworks for digital health solutions and the sharing of sensitive data; and payers will have to account for new types and ways of spending.

Alongside this overhaul of the healthcare system, tectonic shifts in global public- and private-sector budgets are expected: trillions of health dollars will be spent differently than they are spent today. There will be less emphasis on treatment and care, and more on prevention, diagnostics, and digital solutions, such as mobile apps, smart monitoring devices and artificial intelligence (AI)-enabled analytics tools.

Healthcare budgets in countries around the world are, in aggregate, expected to increase by 10 percent by 2030, according to a survey of more than 120 executives at the world's top biopharmaceutical companies,¹ conducted by Strategy&, PwC's strategy consulting business. But some researchers' expectations put the number much higher, at 42 percent. Spending per patient is expected to fall by as much as 28 percent. That's because the number of people having access to healthcare is expected to increase disproportionately to healthcare budgets.²

At the same time, it will be tech companies — not incumbent biopharma players — that are likely to drive the change into this new world of healthcare. Our inaugural #FutureOfHealth Index (see page 12) reveals that biopharma recognizes that tech giants will be the dominant catalyst of these trends and that regulators are seen as the main inhibitors. One reason is that tech companies bring extensive expertise in using data and analytics.

1. Strategy& analysis and survey of more than 120 C-level executives globally from 12 of the 20 largest biopharmaceutical companies, accounting for 70 percent of total biopharma prescription drug revenue, 80 percent of respondents at companies with more than US\$5 billion in annual sales

2. Global Burden of Disease Health Financing Collaborator Network, published in *The Lancet* (2017); OECD; World Health Organisation

In fact, big tech has already entered the prevention and diagnostics markets with its own product developments, filing an increasing number of patents in healthcare in recent years. At the same time, big tech is moving into biopharma's traditional treatment segment through acquisitions and partnerships.

This will pose a significant challenge for biopharma companies and could create a future marked by lower margins. Assuming that operating costs per patient remain at current levels, we estimate that the current average net operating margins of 25 percent could come under serious pressure by 2030. In one scenario, such margins could fall to 17 percent, but there is a second, more severe scenario, in which they could even be erased.

At the same time, there are significant opportunities for biopharma if it is prepared to move strategically into new value pools such as diagnostics, prevention, and digital health solutions. Biopharma companies therefore need to reimagine the future of healthcare. They have three options: to eke out further efficiency gains and win market share, to move into new growth areas such as personalized and preventive medicines, as well as digital health, or to do both.

The good news is that most biopharma companies know this change is coming fast.

- **96 percent** of survey respondents fully (64 percent) or partially (32 percent) agree that the future of healthcare will be people-driven (with individuals increasingly managing their health themselves), preventive, personalized, digital, integrated into daily life, and enabled by new regulatory, organizational, and business models
- **68 percent** expect this scenario to be the norm in major healthcare markets by 2030
- **75 percent** perceive the future of healthcare as an opportunity for biopharma if the sector is willing to disrupt itself
- **85 percent** say they have some or all of the key elements of the future of healthcare on their corporate agenda
- **Only 25 percent**, however, are taking a holistic approach to addressing the challenge

Knowledge is one thing, but time is running short for companies to define a comprehensive strategy so that new value pools can be captured while they tackle the challenges of a changing healthcare environment. The future of healthcare is coming, and it's not a matter of whether, but when, the sector will be disrupted.

The future of healthcare: Sandra's story

The year is 2030 and Sandra, 48, has high blood pressure. She has made exercise part of her daily routine to reduce her risk of serious heart disease, mindful of the fact that her father died from a heart attack at age 63. A smart running shirt monitors her pulse. Her health avatar analyzes her data in real time, compares it with relevant big-data sets, and suggests a suitable training regimen and post-exercise nutrition.

After her run, Sandra has breakfast, which is supplemented by her daily dose of an ACE inhibitor to treat high blood pressure, and extra nutritional supplements. The formulation and dosage change weekly based on the data collected by a microchip implanted in Sandra's heart.

The data collected is submitted to healthcare professionals and insurance companies, with Sandra's authorization, via an ultra-secure, digital data privacy mechanism. Using predictive algorithms, an artificial intelligence (AI) tool analyzes and prepares the data for the healthcare professionals who monitor her condition and check for improvements in response to medication and lifestyle changes. The insurer regularly adapts Sandra's rates based on her personal risk profile and the preventive measures she takes.

However, one day, Sandra's avatar notifies her of an irregular pattern in her heart rate and blood pressure. A severe heart valve defect seems to have formed, and her cardiologist's AI tool proposes treatment options, including a new bio-printed heart valve, nanotech repair, or a personalized drug. Sandra and her doctor agree on the personalized drug accompanied by closer monitoring as the least invasive option.

Specialist biopharma companies use Sandra's health data to adapt the formula and dosage and 3D print a "smart" pill that allows her digitally enabled healthcare professionals to track, via a sensor, progress of the medication through her body.

Could what just happened to Sandra — or most of it — become the new norm of healthcare?



“

The #FutureOfHealth is an exciting vision for our society and a radical transformation. To adjust and play an integral role in this future, providers need to broaden their service offerings towards preventative solutions. Doctors and caregivers need to be educated radically differently — especially around digital tools and data analytics. Additionally, an upheaval of the regulatory framework will be required. Besides questions on liabilities when using digital tools — such as, ‘who is liable for potential harm?’ — the handling of patient data and future reimbursement schemes needs to be rethought. Driven by its complexity and importance, this can only be achieved in a roundtable setting, involving all relevant stakeholders, including the players that are increasingly entering such fields as data and tech.”

Dr. Andreas Wicki, Head of Oncology, Hematology & Immunotherapy at Kantonsspital Baselland, Switzerland

How will the ‘new norm’ of healthcare develop?

Sandra’s scenario is what the overwhelming majority of executives in our survey — as many as 96 percent — see happening.³ And they believe it will be a brighter future for patients: 85 percent expect the quality of care to improve, 67 percent expect efficiency and capacity to increase, and 78 percent believe healthcare will be more sustainable.

Moreover, our survey participants expect this change to happen fast: Two-thirds of biopharma executives expect the major healthcare markets to operate this way by 2030. Personalized healthcare and an increased focus on prevention are expected to come first, with AI-driven applications and patients managing healthcare largely themselves next.

Looking at specific therapeutic areas, the future healthcare model is expected to have the biggest impact on oncology, hematology, cardiovascular, and central nervous system conditions — therapeutic areas in which personalized, digital and/or preventive measures are expected to deliver the most significant medical outcomes and lower healthcare costs for society.

This shift will be driven by North America, followed by China, propelled by the existence of large, established biotech and consumer technology industries, significant healthcare budgets, and regulatory support. Europe is lagging behind, partly due to the absence of these attributes.

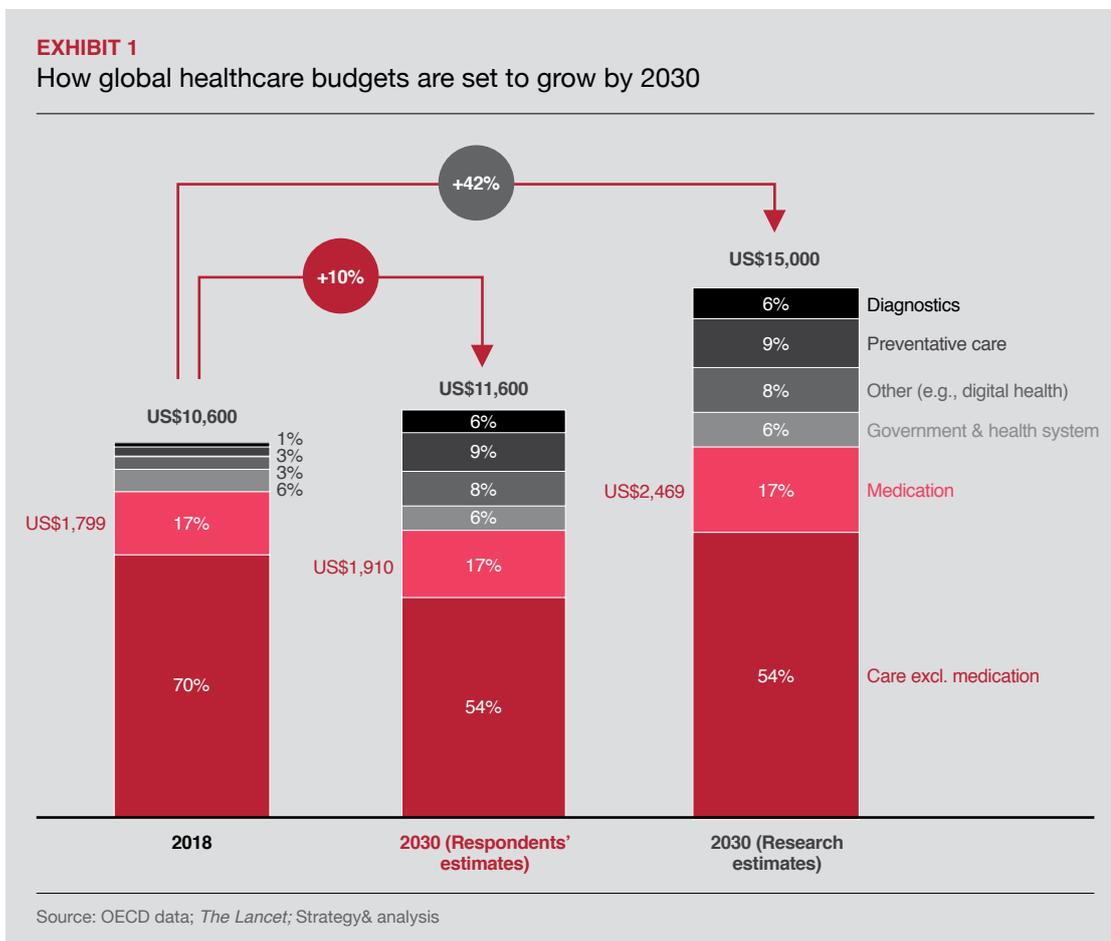
Developing countries do not seem to be on the radar of biopharma executives, even though some countries — notably India — are showing significant promise in healthcare developments. For example, the state of Kerala is transforming itself into a healthcare hub by attracting significant private and public funding for building up infrastructure such as hospitals, academic institutes, and healthcare startups. A fast-growing middle class in India is seeking access to innovative healthcare, too.

3. Strategy& survey

Changing budgets and shifting spending patterns

At first glance, the future does not look too bad for biopharma. The share of global healthcare budgets spent on medication is expected to remain fairly stable at 17 percent until 2030.⁴ Yet on closer inspection, the biopharma business model is set for significant disruption in financial terms (see Exhibit 1).

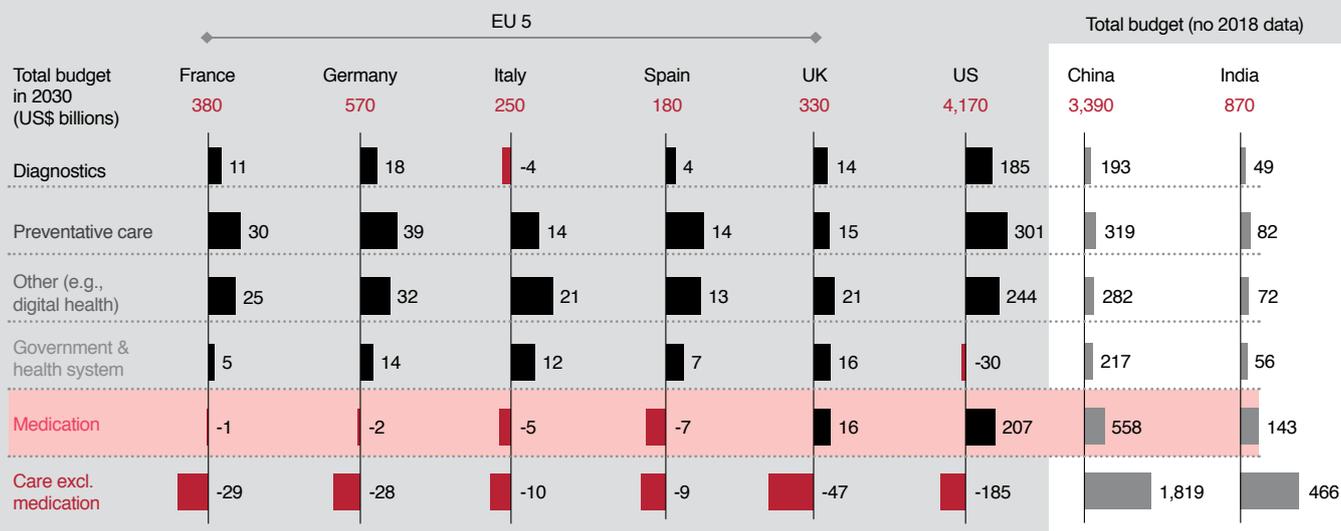
This will be driven by a multitude of factors coming together. According to our survey participants, global healthcare budgets are expected to grow slowly — by 10 percent by 2030. New value pools will be added to these budgets, while some existing value pools will shrink. Significantly more people will get access to healthcare than have access now. All of this will affect per capita spending on healthcare, including drugs, likely shrinking net operating margins of biopharma companies. So what are the numbers behind this?



4. Strategy& survey

EXHIBIT 2

How national healthcare budgets will shift by 2030 (2018 vs. 2030)



Source: OECD data; *The Lancet*; Strategy& analysis

Slow growth in global healthcare budgets

Biopharma executives in our survey predict that global healthcare budgets will increase by 10 percent (to \$11.6 trillion, from \$10.6 trillion currently) by 2030.⁵ By contrast, some researchers see growth of 42 percent (to \$15 trillion) over the same period.⁶ One explanation for our survey respondents' relative conservatism could be that they are assessing the future of budgets through the prism of the current political and regulatory pressures on high drug prices, which many believe could end up shrinking budgets.

The US will remain the world's biggest healthcare market, worth an estimated \$4.17 trillion in 2030, but China is catching up (\$3.39 trillion in 2030)⁷ (see Exhibit 2).

Shifting healthcare budgets to new value pools

The budget shift mentioned above translates into \$1 trillion to \$4.4 trillion of spending moving not only to existing areas, such as diagnostics, but also into new areas central to Sandra's scenario — that is, digital health and more advanced prevention options. This will happen at the expense of care, excluding medication, whose share of global spending is expected to fall from 70 percent now to 54 percent by 2030.⁸ Furthermore, we predict significant shifts within the biopharma value pool itself. Money is expected to be redirected toward personalized medicine for the most complex diseases, and preventive, early-stage, and generic drugs for more easily manageable conditions. This split is likely to lead to significant changes in biopharma companies' portfolios and will require new research and development (R&D) strategies for many players.

5. Strategy& analysis; OECD and World Health Organization (WHO) data

6. Institute for Health Metrics and Evaluation (IHME), University of Washington (2019); *The Lancet*

7. Strategy& analysis, OECD data; *The Lancet*

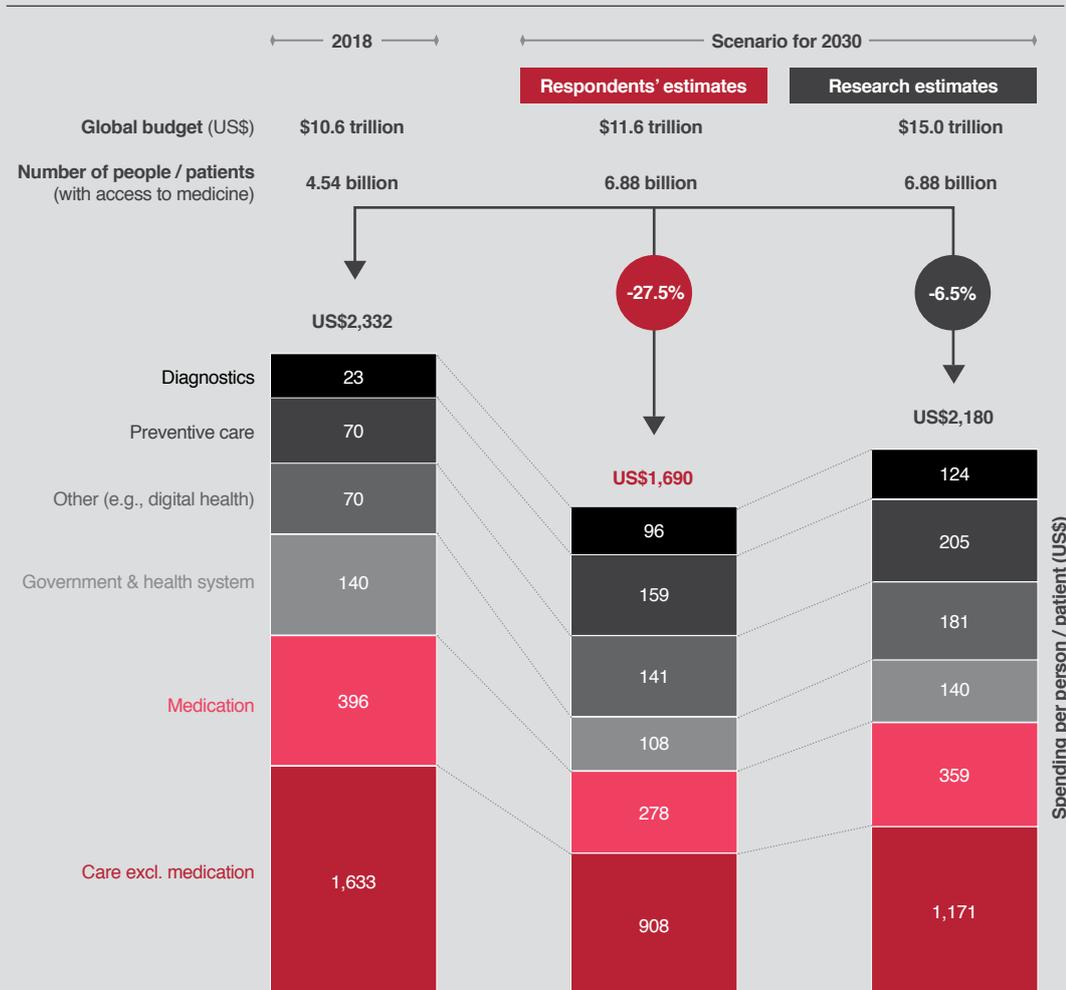
8. Strategy& survey

Significant growth in patients with access to healthcare — and falling per patient spending

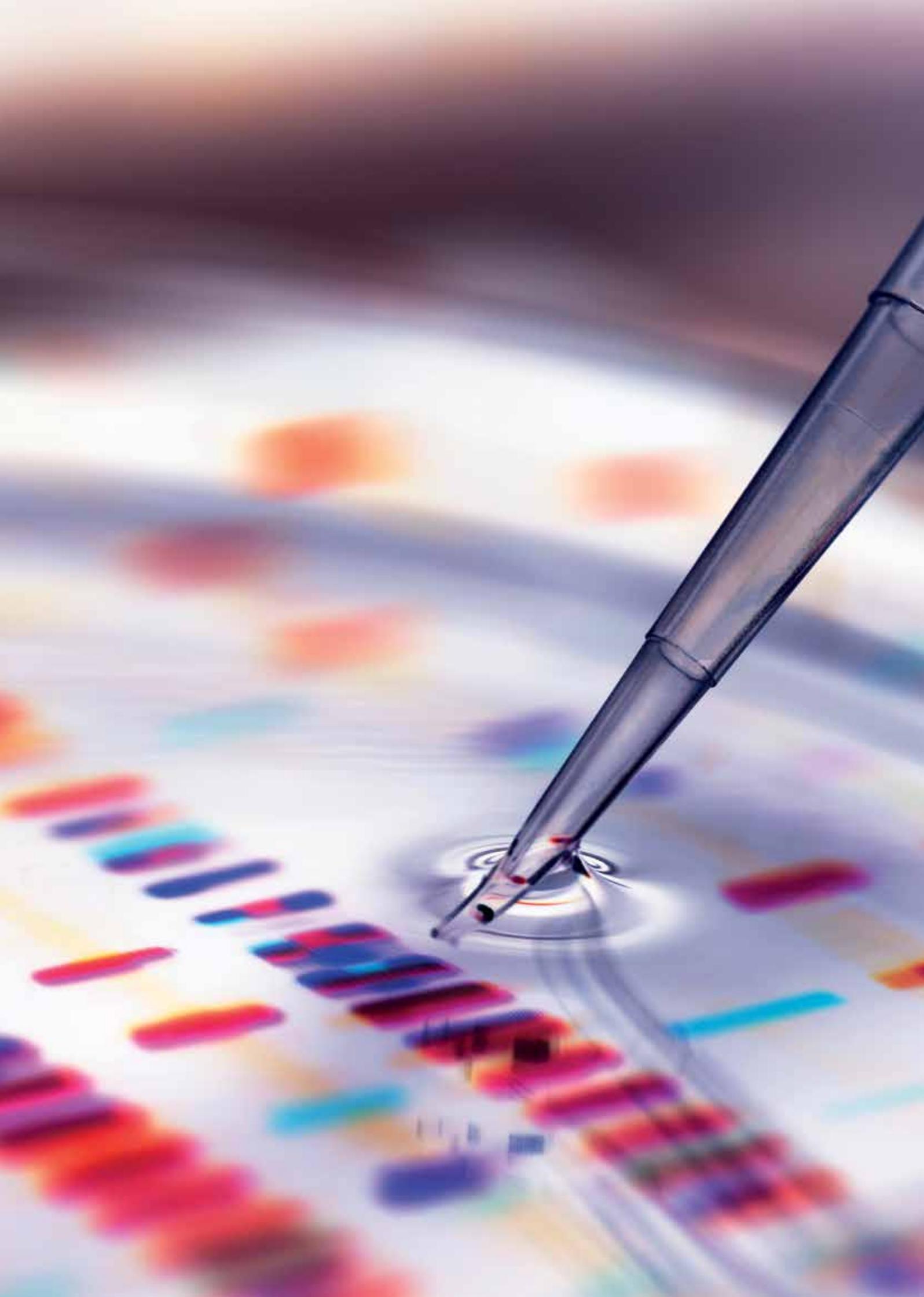
Another big factor in the mix is that the number of patients with access to healthcare is expected to increase disproportionately to healthcare budgets — from 4.5 billion people globally today to 6.8 billion in 2030, according to data from the Organisation for Economic Co-operation and Development (OECD). This will lead to a drop in the amount of money spent on drugs per person. We estimate that the average annual amount spent per person on drugs will fall by 10 percent to \$359 by 2030, from \$396 in 2018 (see Exhibit 3). Using the more conservative estimate of how global healthcare budgets will shift from our survey respondents, this drop could reach 30 percent, to \$278.

EXHIBIT 3

Global healthcare spending per person



Source: OECD; *The Lancet*; Strategy& analysis



Declining bottom line, assuming constant costs

Ultimately, this decline in revenue per patient is expected to have significant implications for biopharma companies' financials. Assuming operating costs per patient remain at current levels, we estimate that current average net operating margins of 25 percent could come under serious pressure by 2030.

In one scenario, based on our analysis of four data and research sources,⁹ such margins could fall to 17 percent. But there is a second, more severe scenario — based on three of the same four inputs¹⁰ — in which they could even be erased (see Exhibit 4). This hit on net operating margins is likely to particularly affect large biopharma companies selling higher-priced, blockbuster drugs. That is because they are increasingly in the regulatory spotlight over drug prices, in contrast to makers of low-margin, generic drugs.

9. Research published in *The Lancet*, research produced by the University of Washington's Institute for Health Metrics and Evaluation, OECD and WHO; Strategy& survey; data from NYU Stern analysis of more than 700 biopharma companies' operating costs (2019)

10. OECD and WHO data, Strategy& survey; data from NYU Stern

EXHIBIT 4

How net operating margins will erode by 2030

Average biopharma net operating margins

	2018	Scenario for 2030	
		Respondents' estimates	Research estimates
Revenue per person/patient (US\$) ¹	\$396	\$278	\$359
Cost per person/patient (US\$) ²	\$297	\$297	\$297
Net operating margin per person/patient (US\$) ²	\$99	-\$19	\$62
Net operating margin (%)	25%	-7%	17%

1. Numbers represent averages, and individual firms' performance might differ.

2. Assumes constant cost profiles for biopharma companies in 2030 to illustrate need for change. Efficiency gains likely will help biopharma sustain higher margins.

Source: Research published in *The Lancet*; research produced by the University of Washington's Institute for Health Metrics and Evaluation, OECD, and WHO; Strategy& survey; data from NYU Stern analysis of more than 700 biopharma companies' operating costs (2019)



The #FutureOfHealth highlights several critical challenges our society is facing in the near future. Delivering on the promise of digital, personalized, preventive and people-centric healthcare will require major transformations. Today, in most countries, health data is not interoperable due to unresolved technical, semantic, and governance questions. This not only hampers the use of a citizen's personal data for improving their own health and care, but also secondary use for research. Competences in modern bioinformatics and data analytics need to be strengthened in the education of doctors, care providers, and life science researchers in a lifelong learning process.

While sharing of health data opens new opportunities for data-driven discovery of novel therapeutic interventions, it also poses challenges to a healthcare system based on data protection and non-discrimination. One key task of today's leaders will be to bridge the gap between different research and innovation cultures in information and communications technology and the pharma industry to engage in a constructive collaboration — and not disruptive competition — to shape the future of health.”

**Professor Dr. Torsten Schwede, Vice President for Research,
University of Basel, Switzerland**

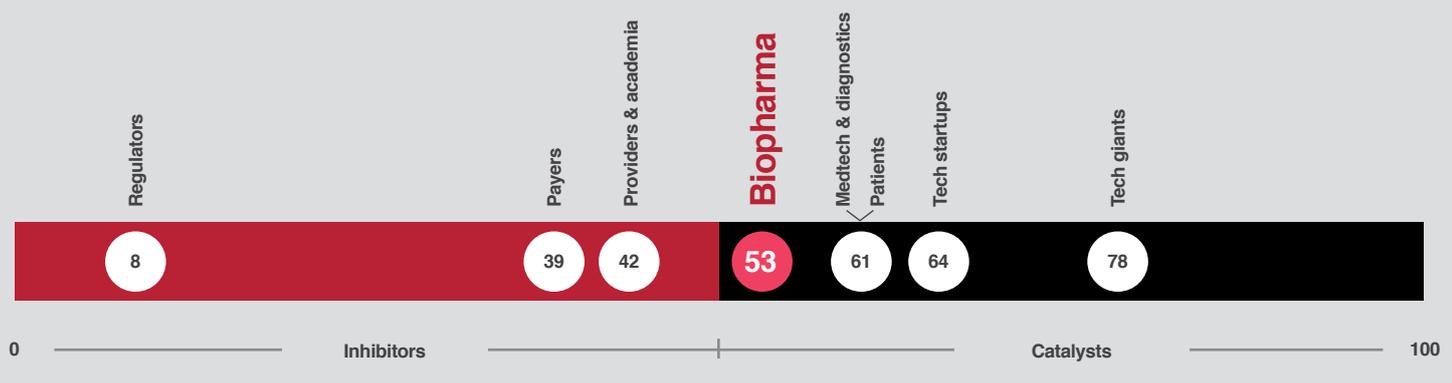
How tech is moving into healthcare

Amid this environment of shrinking biopharma margins, big tech is likely to be in the driver’s seat in grasping the opportunities in healthcare and the new value pools they will generate — as our survey respondents recognize (see Exhibit 5). Our inaugural #FutureOfHealth Index reveals that biopharma realizes that tech giants are the dominant catalyst of these trends and that regulators are seen as the main inhibitors (see Exhibit 6, next page).

Tech players are showing themselves adept at using their strengths in consumer electronics as well as their unrivaled access to consumers to start building data-led health ecosystems. They also bring expertise in using data and analytics, a deep behavioral understanding, and a relentless focus on customer experience in the consumer sector in which many have their roots.

EXHIBIT 5
#FutureOfHealth Index

Future inhibitors and catalysts of six #FutureOfHealth trends



Source: Strategy& survey

EXHIBIT 6
#FutureOfHealth Index: Inhibitors and catalysts, by trend

	People-driven	Prevention	Personalization	Digitization	Integration	Organization
Tech giants	++	+	+	+++	+++	+++
Tech startups	+	○	○	++	++	+
Medtech & diagnostics	○	+++	+++	+	+	-
Patients	+++	-	-	--	○	--
Biopharma	○	--	++	○	-	++
Providers & academia	--	○	○	-	--	---
Payers	-	++	--	○	○	+
Regulators	---	---	---	---	---	○

+++ Very high catalyst role ○ Indifferent / undecided role --- Very high inhibitor role

Source: Strategy&

Big tech is already applying this expertise in healthcare too. One recent example was Amazon’s Alexa, which entered the healthcare sector for the first time earlier this year by adding the capability to capture and transmit patient data, after having been deemed compliant with the US Health Insurance Portability and Accountability Act (HIPAA), and, hence, offering a health app platform. This is an important requirement in the sector when it comes to ensuring that healthcare data is handled with the right privacy and other safeguards.

Big tech is also filing patents to establish positioning in the prevention and diagnostics space, as well as ramping up investments in healthcare, moving into the care and treatment market segments — a traditional stronghold of biopharma companies.

Indeed, five of the biggest tech companies — Alibaba, Alphabet, Amazon, Apple, and Tencent — collectively filed more than 3,500 healthcare patents in the five-year period up to and including 2019 year-to-date. This was more than double the number filed in the previous five-year period until 2014.¹¹ In addition, there has been a 12-fold rise in the number of healthcare investments by that same group of companies over the same two periods, based on figures from Dealogic (see Exhibit 7).

According to the 2019 New Health Economy report by PwC’s Health Research Institute, consumers are also increasingly open to tech giants entering healthcare: half of US consumers would be somewhat or very likely to try a Food and Drug Administration–approved app or online tool for their treatment. They would also be comfortable with receiving health services from a tech company such as Google or Microsoft.

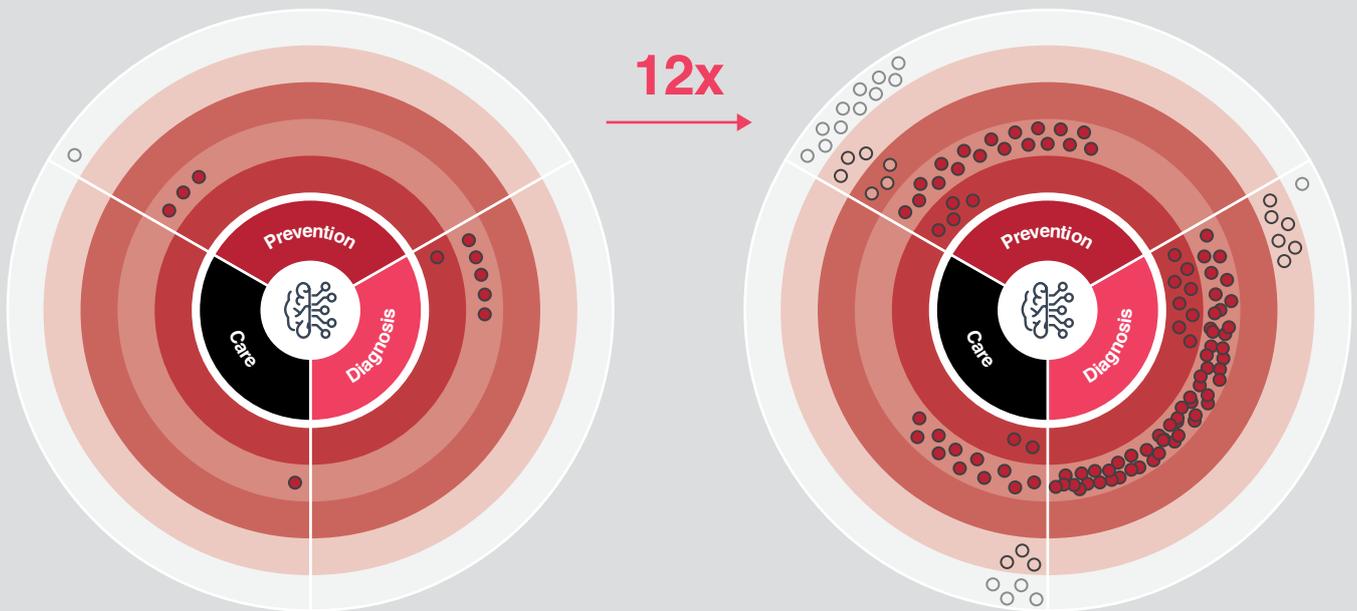
In Germany, 60 percent of consumers have a positive view of the application of novel technologies in healthcare, according to a recent Strategy&/PwC population survey, and in the UK, nearly a third of patients would be willing to have major invasive surgery performed by AI.¹²

11. <https://www.lens.org> (search terms: medical, healthcare, life science)
 12. <https://www.pwc.co.uk/industries/healthcare/patients-voice.html>

EXHIBIT 7
 How tech giants are investing in healthcare

Healthcare investments of tech giants 2010–14

Healthcare investments of tech giants 2015–19 year-to-date



■ Amazon ■ Alphabet ■ Apple ■ Alibaba ■ Tencent

Note: Investments derive from acquisitions, ventures, and partnerships.

Source: Dealogic data (2019), Strategy& analysis



How biopharma must change

Although these figures are clearly alarming to biopharma leaders, it's worth acknowledging that this analysis involves comparing averages, and that individual companies' outcomes will be affected by many variables, including individual company cost and revenue profiles, differences among national healthcare systems (public and private), and different drug spending profiles in relation to individual patients and particular diseases.

Nonetheless, the analysis is clearly a wake-up call for biopharma and shows that standing still is not an option. In essence, the three options for biopharma companies are to make their operations significantly more efficient in order to maintain margins, to expand into new growth areas such as personalized as well as preventative medicine and digital health, or to combine elements of both.

There are significant grounds for optimism. Although biopharma's share of the total budget is expected to remain fairly stable, new value pools are emerging. The share of the total budget accounted for by diagnostics, prevention, and other markets such as digital health is expected to triple, from around 7 percent to 23 percent, by 2030.¹³ Those markets combined are expected to grow in value from \$740 billion to between \$2.7 trillion (based on our survey respondents' estimates of future budgets) and \$3.5 trillion (based on some researchers' estimates). In both scenarios, this outpaces biopharma's core market for medication, which is seen growing from \$1.8 trillion in 2018 to between \$1.9 trillion and \$2.5 trillion, respectively (as shown in Exhibit 1).

There have been recent encouraging signs that biopharma has been on the acquisition trail as a way of locking in these opportunities in 'healthtech.' For example, Roche in 2018 acquired Foundation Medicine, which specializes in genomic profiling to personalize cancer treatment, and Germany's Merck formed a data and analytics venture with Palantir in 2018.

And as our survey showed, three-quarters of executives perceive the future of healthcare as an opportunity if they are willing to disrupt themselves — recognizing that a comprehensive transformation of almost any function of the biopharma business model is required. Future healthcare trends are expected to have the strongest impact on R&D, followed by medical and market access, patient and customer services, and marketing and sales.

13. Strategy& survey and analysis; OECD and WHO data

More than 90 percent of survey participants view the build-up of data and analytics capabilities, and the protection of access to — and integration of — internal and external health and lifestyle data sets as key to success in the future (see Exhibit 8). New business models focused on prevention must also be created, accompanied by the right capabilities and the right mind-set throughout the workforce. Eighty-five percent of respondents said that they have some or all of those elements on their corporate agenda. But only one out of four surveyed executives thinks that their company is taking a holistic approach to addressing the challenge, and this hints at some hurdles that need to be overcome:

EXHIBIT 8
Organizational implications and hurdles

Organizational implications

Build up data and analytics capabilities	96%
Build up the required capabilities and mind-set	94%
Complement and innovate novel business models	93%
Access and integrate internal/external longitudinal patient data	92%
Broaden and refocus offering to customers vs. patients	87%
Streamline internal processes to allow for personalization	87%
Co-shape regulations and offer suitable access models	87%
Partner vertically for closer client connection and non-disintermediation	75%
Balance hyperlocal and large centralized production approaches	69%

Internal hurdles

- 70%**
Culture & awareness
- 47%**
Capability gaps
- 35%**
Structural constraints
- 18%**
Lack of incentives
- 16%**
Budget constraints
- 9%**
Capacity gaps

External hurdles

- 71%**
Regulatory & legal hurdles
- 37%**
Data availability & accessibility
- 22%**
Ethical & social concerns
- 21%**
Infrastructure limitations
- 19%**
Technical feasibility
- 17%**
Lack of stakeholder capabilities
- 9%**
Budget constraints



Source: Strategy & survey

Internal

Culture/awareness: Biopharma companies typically operate in a stable, slow-moving, highly regulated market and are not likely prepared for disruption on the scale that we think lies ahead. Creating awareness of this and getting buy-in for the adaptation required of employees and shareholders will be challenging. In addition, it will be important to foster a company culture that defines responding effectively to constant change as a core capability.

Capability gaps/structural constraints: Although biopharma is selectively investing in data and analytics capabilities, it often lacks an overarching strategy and fails to integrate data and analytics across the business. Biopharma tends to leverage data to promote business activities, whereas big tech builds its business around the data.

External

Regulatory and legal hurdles: The biopharma environment is heavily regulated when it comes to the clinical testing of products, interaction with patients, and collection of patient data. The regulatory landscape is evolving, and biopharma needs to actively engage in discussions with regulators to shape these elements.

Data availability and accessibility: Gathering data and making it available to the relevant parts of an organization can be difficult due to regulatory issues and patient privacy concerns. Tech is a threat here, because it is better able to navigate this environment, and there is a danger that it might use this strength to “decouple” biopharma from critical data sources.

So what could be biopharma's answer?

Reimagine healthcare

Coming from a decades-long successful business model and environment, biopharma executives should fundamentally reimagine the future healthcare landscape. Pressing and defining questions are emerging: What are people's most important health needs? Is society still willing to pay a premium for health innovation? Will biopharma's main business remain drugs, or will be it based on data or digital therapeutics?

Define a clear stand

Biopharma companies need to define their strategic positioning. We think there are three options:

- Remain a traditional drug manufacturer, significantly improve efficiency, and try to gain market share
- Unlock new value pools within the broader healthcare landscape, such as digitally enabled preventive solutions
- Take a combined approach

Reimagine the business

Biopharma companies may need to shake themselves out of a complacent mind-set and work out how to play in new value pools as a way to lock in future margins.

- **Culture and leadership:** Establish a mind-set across the organization that is driven by a “test/fail/learn quickly” mentality and in which people are not afraid of change but rather value responding to continual change as a differentiating capability. Employees must be empowered and willing to take decisions quickly — with the knowledge that their managers will back them.
- **People skills and systems:** Hire people who bring new capabilities in digital health solutions development and commercialization, bioinformatics, and customer experience. To retain them, adopt incentive models that startups are using, such as a more generous share incentive plan. Give employees the opportunity to work on innovative ideas.
- **Business and operating model:** Be open to entering into co-funded and co-led partnerships, bearing in mind that the new healthcare market will likely be made up of ecosystems of complementary players all revolving around the patient. Establish and commit to a business that you are willing to challenge and adapt at any point in time. Consider targeted, “bolt-on” acquisitions as well as partnerships.

Sprint with pilot projects

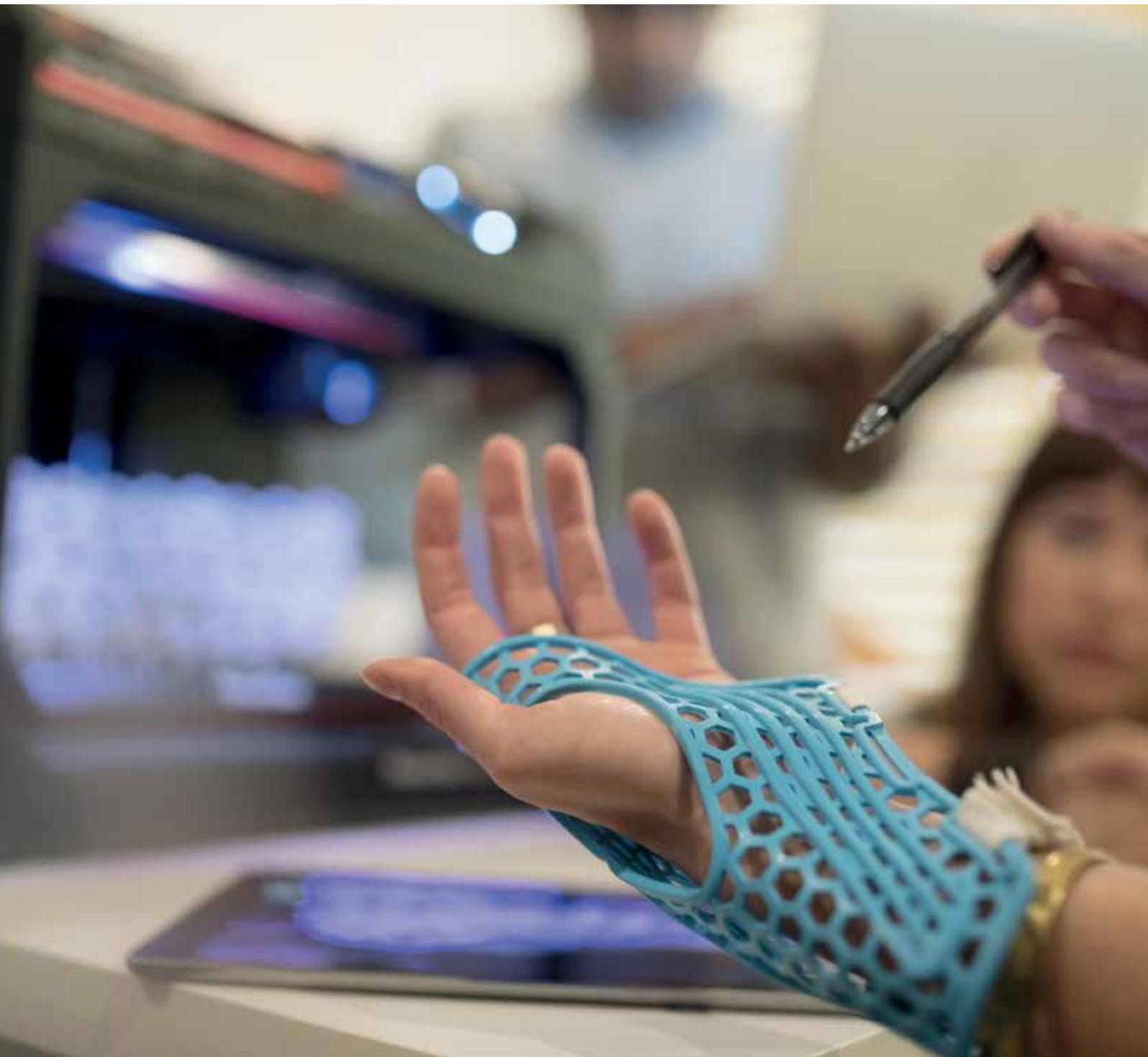
Test and validate new strategies by using pilots. Learn from failures, and scale into a sustainable, new business model.

Time is running out to experiment and define a winning strategy. The future of healthcare will be exciting, full of opportunities and new competition.

Act now to shape it.

#FutureOfHealth

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