



# Winning in the future of medtech

Novel partnerships with consumer tech to transform  
care delivery

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The health industry is on the cusp of a major transformation that will affect all stakeholders. Incumbent players can either lead this transformation as innovative and well-connected market leaders, or they can try to resist this inevitable change. A wide range of companies—from inside and outside of the health care sector—are already making strategic investments that could form the foundation for a future of health that is defined by radically interoperable data, open and secure platforms, and consumer-driven care. For more on Deloitte's perspective on the future of health, visit [www.deloitte.com/future](http://www.deloitte.com/future).

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# Executive summary

In Ridley Scott's 2012 movie *Prometheus*, late 21st century space explorers rely on a MedPod to diagnose their medical conditions, perform basic triage, and even conduct fully automated surgeries. The glass-enclosed incubator utilizes a wide range of emerging technologies, including artificial intelligence (AI), enhanced imaging and 3D visualization, laser scalpels, advanced robotics, and natural language processing (NLP).



IT TURNS OUT the late 21st century is already here. All these technologies are being explored. While MedPods might not be the best analogy, we do expect medical devices of the future to look significantly different than they do today. Devices can allow consumers to diagnose (and sometimes even treat) conditions at home or on the move—either on their own or with assistance from a virtual clinician. Always-on sensors in our clothes, our bodies, and throughout our homes can continuously and passively gather data about our health and alert us and our care teams to potential health issues

before they become symptomatic. So, in this changing landscape, what will the future medtech company look like?

To explore this issue, the Deloitte Center for Health Solutions conducted a crowdsourcing simulation with 38 experts (from digital health startups, medtech companies, technology companies, health plans, health systems, and researchers) over the spring of 2019. We supplemented our findings with interviews with Deloitte subject matter experts and secondary research.



Our research found that while many medtech companies are well-positioned to drive the future of health, they likely won't be able to do it alone. Rather than focusing on making incremental improvements to their devices, they should focus on using transformative and cognitive technologies to enhance products and offer services. They could do this by developing or partnering to acquire sophisticated data analytics capabilities, getting much closer to the consumer, and leveraging new cognitive technologies to improve operations. Our view is that medtech companies will likely be able to do this best by partnering with consumer-focused technology and specialized digital health companies. These companies have advanced capabilities, including the ability to collect, store, and analyze vast amounts of health data generated by medical devices (and other sources of vast amounts of data), as well as deep insights on what motivates and engages consumers.

**Rather than viewing technology companies from outside the health industry as a competitive threat, medtech companies can look at them as potential partners.**

Rather than viewing technology companies from outside the health industry as a competitive threat, medtech companies can look at them as potential partners. And there's good reason to do so:

- Although consumer-focused technology companies have access to a large customer footprint, they likely lack the deep industry knowledge and the credibility with physicians that leading medtech companies have. Both players could complement each another.
- Without such partnerships, medtech companies could face a disruptive threat from new entrants, or from existing competitors that have formed alliances with these very same consumer and digital health companies.
- They may find it difficult to manage costs and complex technologies alone, making partnerships an important consideration for medtech companies.

Developing or partnering to acquire sophisticated data analytics capabilities could go a long way in not only helping medtech companies stay relevant in the future of health care, but also taking them a lot closer to the consumer.

# What might the future medtech company look like?

Twenty years from now, medtech companies' business models are likely to change dramatically, and multiple organizations might have to collaborate with each other to address the increasingly complex health needs of consumers.

**M**EDTECH COMPANIES HAVE traditionally been focused on developing hardware (e.g., surgical equipment, joint replacements, diagnostic equipment, infusion pumps, and pacemakers). But software, along with data collection and analysis, is likely to act as a key factor in influencing health care businesses in the future. In many ways, data collected from the hardware will be more valuable than the hardware itself. And 20 years from now, we expect that most of this medical hardware will be commoditized. What can set medtech companies apart from each other will be their ability to harness data gathered by their devices and use it to improve well-being, anticipate health issues, and help patients change the day-to-day behaviors that affect their health.

We foresee an omnipresent, proactive, and integrated system of health and well-being completely replacing our current illness-focused system by 2040. Transformational technologies (e.g., AI, quantum computing, cloud storage, and augmented and virtual reality), an explosion of mineable data, tech-savvy companies from outside the industry, and empowered consumers armed with actionable data are among the forces that are likely to define the future of health. Rather than focusing on how to most effectively treat illnesses, technology is likely to help keep people from having an illness or medical event in the first place (see sidebar, "Prevention and personalized care in medtech").

## PREVENTION AND PERSONALIZED CARE IN MEDTECH

Medical device manufacturers—such as those that develop artificial joints and other implantable devices—could enable a shift toward more preventative care. For example, to position themselves for the future, a company that manufactures artificial joints might invest in diagnostic sensors that can detect the early stages of joint degeneration. Rather than using this information to develop a better artificial joint for a damaged ankle, for example, what if a medtech company developed a sensor-equipped sock that detects the early stages of joint degeneration? This might help patients avoid joint replacement in the first place. Imagine the billions, or even trillions, of data points that medtech companies could have at their disposal by incorporating such sensors into their devices. If a new joint is needed, it could be created by a 3D printer and customized to the patient.

As described in our recent article *Forces of change: The future of health*, medtech companies of the future could exist in more than one category. We expect three broad categories will emerge to largely replace the siloed industry segments (such as health systems and clinicians, health plans, biopharmaceutical companies, and medical device manufacturers) that we have now:

- **Data and platform:** Data will come from multiple sources and be the basis of both preventive activity and research—it can help innovators develop analytic tools, and to generate the insights needed for personalized, always-on decision-making. Organizations could either be leaders in data management by setting standards for interoperability and make money from deriving insights, or they could be supporters by providing data to other stakeholders in the health system. Nontraditional data sources (not health care-specific) could be combined with traditional health care data to

## We foresee an omnipresent, proactive, and integrated system of health and well-being completely replacing our current illness-focused system by 2040.

provide new insights and deeper understanding of external influences and barriers to precursor indicators, and compliance behavior moderation.

- **Well-being and care delivery:** Medtech organizations of the future are likely to succeed if they enable well-being and care delivery. While companies will continue to develop innovative new products and improve upon existing ones, the devices are expected to incorporate software, applications, and data collection (see sidebar, “What is a medical device and how will the definition change in 2040?”). The health care delivery system is also expected to undergo a sea change: Community health hubs, specialty care operators, virtual communities and care-delivery mechanisms, and product developers are likely to promote health and well-being using strategies tailored to the individual’s own genes, cells, behaviors, biome, and other factors influencing their well-being.

- **Care enablement:** The future medtech company may also have a role to play in care enablement, as connectors and intermediaries (enterprise tool developers, supply chain designers and coordinators, and delivery service providers). These are the logistics providers that will run the just-in-time supply chain, facilitate device and medication procurement operations, and get the product to the consumer. As we see the shift toward more preventive care and away from acute intervention, medtech companies—and not just hospitals and health systems—should think of their customers as the patient.

# Innovation is the way forward for both medtech and consumer technology companies

According to the experts who were part of the crowdsourcing simulation, the medtech company of the future will likely face a rapidly shifting health care landscape due to digital technology, competition from consumer technology companies, and new care models.

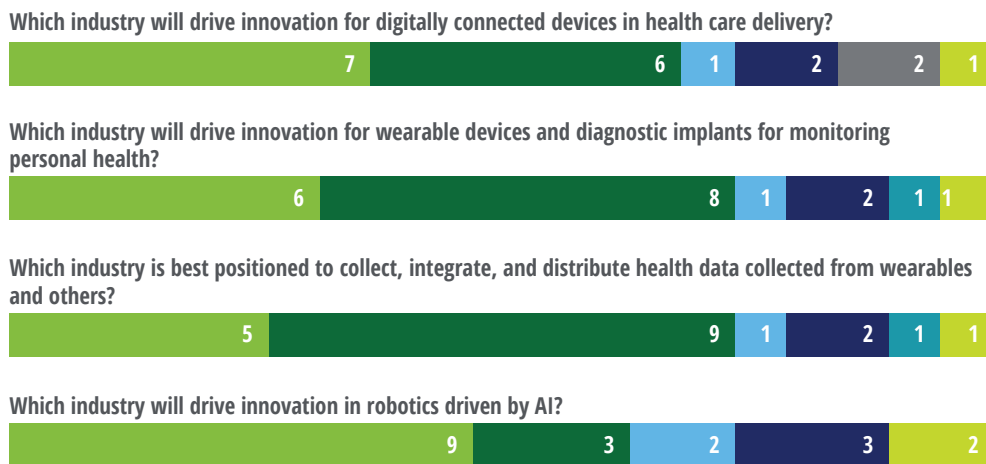
They should be prepared to innovate across the complete patient journey. The experts believe that both medtech and consumer technology companies

will each drive innovation in the near future (see figure 1).

FIGURE 1

## Most respondents believe medtech and consumer tech will drive innovation

■ Medtech ■ Consumer tech ■ Retailers ■ Health care providers ■ Insurance providers  
■ EHR providers ■ Others



Sample size: 19

Source: Numbers denote the response of participants from crowdsourcing exercise. It highlights the industries, according to the experts, which will drive innovation with new technologies.



## WHAT IS A MEDICAL DEVICE AND HOW WILL THE DEFINITION CHANGE IN 2040?

Currently, [medical devices](#) are those that fall within the purview of regulatory agencies. In 2013, the International Medical Device Regulators Forum (IMDRF) expanded the category beyond hardware to include Software as a Medical Device (SaMD). SaMD is defined as “software intended to be used for one or more medical purposes that perform these purposes without being part of a hardware medical device.”<sup>1</sup>

The 21st Century Cures Act, passed in 2016, identified software functions to be excluded from the Food and Drug Administration’s (FDA’s) definition of device—specifically that the term device does not include the software functions such as software used for administrative tasks, to support a healthy lifestyle, electronic patient records, medical device data systems (MDDS), and certain clinical decision support tools. However, the FDA is required to periodically review these software categories to examine the associated health risks and benefits.<sup>2</sup>

The crowd believed the regulatory boundaries between SaMD, nondevice medical software, and consumer technology would continue to evolve, and the boundaries would likely blur. Regardless of where the boundaries fall, software and the data it generates are critical drivers on the journey to the future of health.

Future opportunities for medtech companies are likely to fall outside traditional industry nomenclature. Imagine this: A drone goes directly to a patient’s home and picks up biospecimens for delivery to a lab. Is that drone a medical device? What about the software that enables it? Who will develop that drone?

The crowd agreed that conventional medtech companies will continue to lead in [Class II and III](#) medical device categories (devices with a moderate to high risk to patients)—which represent 62 percent of all current devices<sup>3</sup>—because of their expertise and ability to effectively navigate the regulatory process. These include robotics and connected, implanted devices.

Consumer technology companies (e.g., Google, Apple, Amazon, Microsoft, and others) are becoming increasingly equipped to innovate through [Class I](#) devices (low risk to patients).<sup>4</sup> These devices, which represent 35 percent of all medtech devices today, include wearable technologies and offer the advantage of data collection, storage, and analysis. Consumer technology companies often have access to large customer databases, which is a valuable additional source for real-world data ([RWD](#)). According to the experts in the simulation, this access to consumer-generated data (nonhealth data that leads to health insights), a massive

research and development (R&D) budget, efficient distribution channels, and an embedded culture of innovation can give some technology companies an advantage over established medtech companies.

However, consumer technology companies are not likely to limit their investments to Class I devices. Some leading consumer technology companies are also starting to develop Class II devices. For example, the FDA classified Verily’s study watch as a Class II medical device for its on-demand electrocardiogram (ECG) feature. The watch is a prescription-only device that monitors ECG rhythms.<sup>5</sup> Consumer technology startups are also disrupting the industry by developing innovative devices such as smart patches that monitor heart

**Note:** A [glossary](#) of key terms is provided in the appendix. Key terms have hyperlinks that will take the reader to the glossary, such as “[medical devices](#),” below.

rate, oxygen saturation, hydration, and breath rate in real time, and in some cases, are potentially giving large devices such as MRI machines a run for their money with advanced wearable technology.

As the health sector transitions from a focus on acute intervention to one centered around prevention and wellness, technologies will likely evolve (figure 2). During the crowdsourcing exercise, we asked participants to highlight technologies that they think could transform the quality of health care. Nearly 80 percent of participants voted for artificial intelligence (AI), followed by robotics (53 percent), and nanotechnology (47 percent). AI,

specifically machine learning, is expected to drive the assimilation of massive and seemingly disparate datasets from these devices to help enable exploration of old questions in new ways, and new questions that were previously too difficult to analyze. The crowd of experts also pointed out that technologies such as **augmented intelligence** could offer clinical decision support to physicians, since they provide real-time inputs with comprehensive reviews and analysis of a patient’s history.

Where might medtech companies lead, and where might consumer technology companies lead? (See figure 2.)

FIGURE 2

### Technologies that support the patient journey

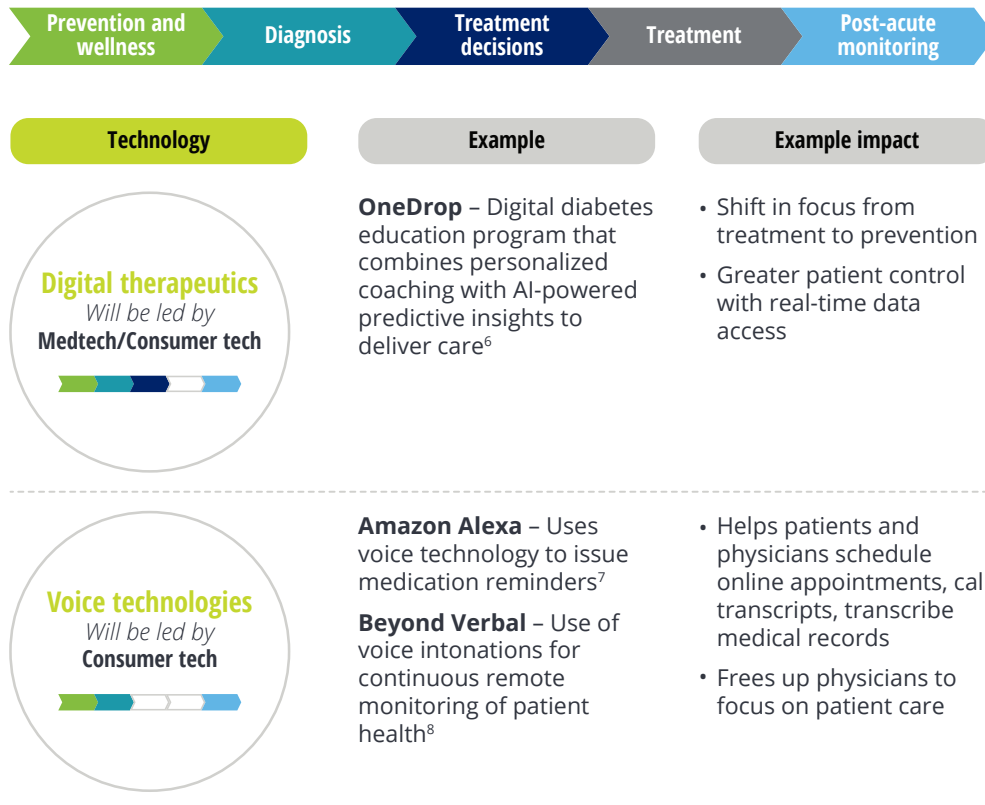


FIGURE 2 *continued*

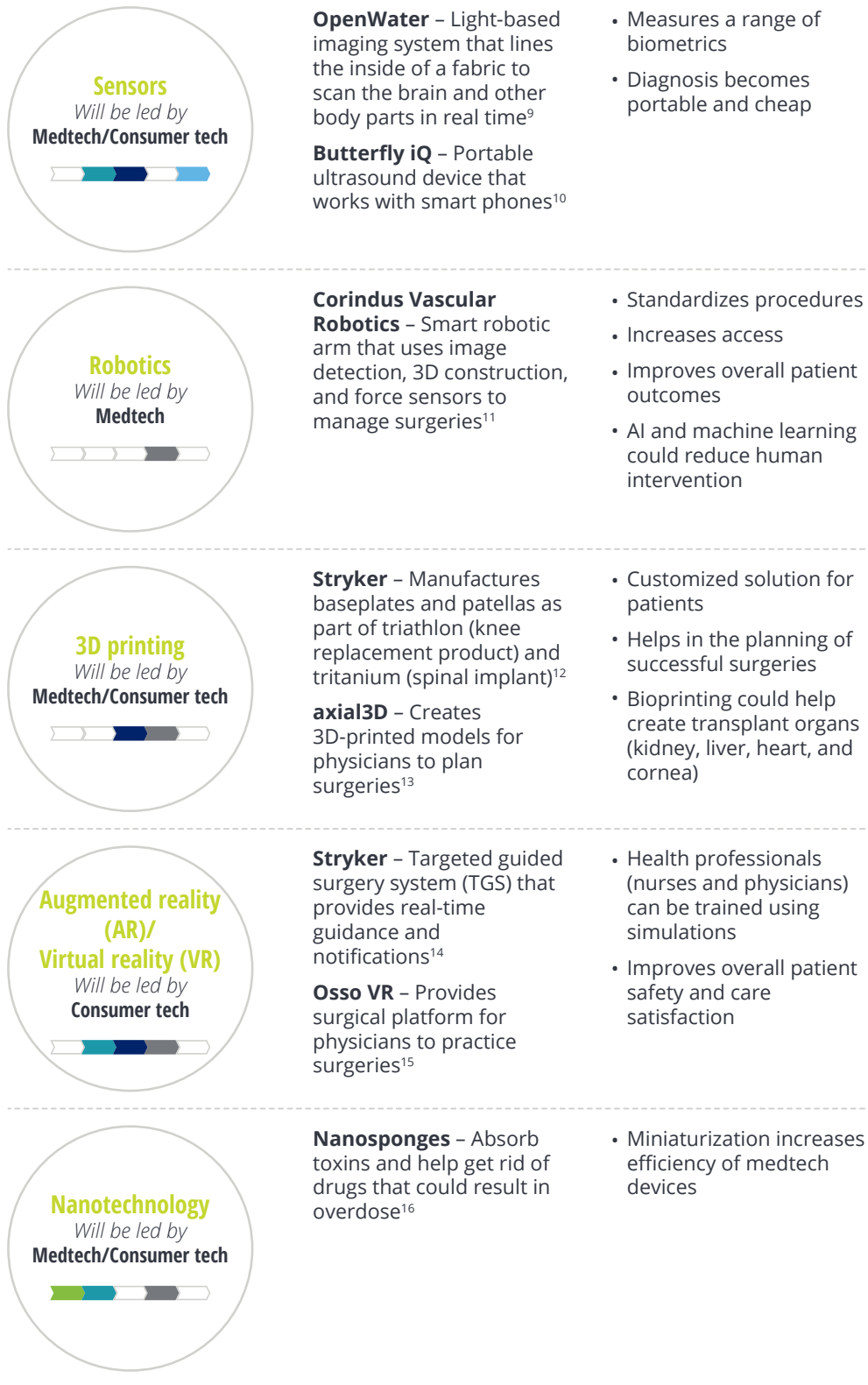


FIGURE 2 *continued*

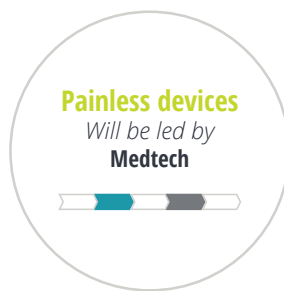


**BRCA test kit** – Tracks genetic mutation that causes certain types of cancer<sup>17</sup>

**Cholesterol test kit** – Tracks cholesterol and triglyceride levels<sup>18</sup>

**Ovarian reserve test kit** – Measures a woman’s ovarian reserve to help physicians counsel patients for family planning<sup>19</sup>

- Data generated from genetic test kits can help scientists in their research
- Diagnosis becomes affordable and accessible for patients



**Picofluidics** – Microneedle helps with drug delivery, sample collection for diagnostic purposes, and early detection of disease<sup>20</sup>

**Seventh Sense Biosystems** – TAP enables blood collection through a virtually painless process<sup>21</sup>

- Creates drug delivery opportunities for otherwise difficult-to-reach organs
- Provides alternative treatment options for certain forms of skin cancer
- Improves patient experience

Source: Deloitte analysis.

While there are some areas in which medtech companies are likely to have an innovative product line of their own, they may need a helping hand to develop technologies across the patient journey. Specifically, consumer technology companies are likely to lead the development of technologies such as AI, voice recognition, and AR/VR. Both medtech

and consumer technology companies could take the lead for technologies such as digital therapeutics, sensors, 3D printing, and nanotechnology. While traditionally medtech companies have focused on hardware development, partnerships with consumer technology companies could help them tick the software box as well.

# A focus on services and analytics could help medtech improve patient outcomes

Beyond product offerings, medtech companies are also positioned to help hospitals and health systems make the transition to the future of health through services.

**M**EDTECH COMPANIES COULD play a significant role in reducing medical costs, optimizing surgeon performance, and improving patient outcomes in the near term. We asked the experts in the simulation which services medtech companies should offer to maximize their impact on hospitals and health systems. The top three services were:

1. **Remote patient monitoring:** Seventy-two percent of crowd participants cited this as an added-value service that medtech companies should offer. Data that comes from connected devices, such as wearables, could prevent the progression of disease and move patients to lower-cost care settings. For example, the ability to monitor cardiac rhythms remotely could allow caregivers to detect physiological changes that warrant adjustments in medications and allow heart patients to stay home. This technology also could proactively provide alerts and health status updates to the care team so more severe disease states can be avoided. Additionally, remote patient monitoring could revolutionize the way medtech companies research disease states, conduct clinical trials, and develop products. Always-on digital sensors could be incorporated into joint implants and provide ongoing product performance data

in real time. Connected lenses could detect changes in the eye's vitreous pressures or changes in lens shape. These findings could then be used to improve products that are in the development pipeline as well as treatment techniques and improved long-term outcomes. This could lead to the development of better devices that can be released into the market faster.





- 2. Data storage and integration:** An explosion of interoperable health care data (see sidebar, “The importance of interoperability”) is expected to dramatically improve diagnosis, clinical decision-making, and help deliver better patient outcomes. Sixty-seven percent of our crowd participants agreed that data storage and integration will be a key service for medtech companies in the future. Integrated data could help clinicians make more informed decisions about how to improve patient care. Rich datasets could also help fuel innovation by mapping the patient journey in much greater detail. This could lead to better patient outcomes, lower health care costs, and stronger relationships between medtech companies and providers.
- 3. Improving clinical efficiency:** Nearly half of our crowd (45 percent) said medtech companies could help generate better outcomes by improving clinical efficiency. Some examples of this include how technology is beginning to revolutionize the way health professionals are trained and treat patients; and how technologies can help design cost-effective clinical trials. AR and VR are already being used to train physicians, nurses, and other health professionals. 3D printing is being used to create realistic anatomical models that can be customized for virtually any clinical situation. These technologies combined create a true-to-life environment for learning or surgical planning, which can reduce training time and improve overall

## THE IMPORTANCE OF INTEROPERABILITY

In our view of the future of health, radically interoperable data is likely to play a huge role in transforming health care. Data from medical technologies such as wearables, remote monitors, and sensors will be standardized, stored, updated, and aggregated with other sources of information such as social media platforms, retailers, and electronic health records. The combined data will create a complete personal profile that physicians and health systems can use to help ensure that health services are delivered in a timely and appropriate fashion.

In a 2019 Deloitte survey of 100 health care and life sciences technology executives, more than 70 percent cited hospitals, health systems, and medtech companies to be the most important stakeholders in achieving interoperability. Respondents also cited retailers and large technology disruptors as key stakeholders. However, respondents also pointed out difficulties managing the virtual “fire hose” of data that is currently available. Specifically, they pointed to issues with timeliness and usefulness of information, and cited privacy and data security concerns, data standards and normalization, and disparate software platforms as the biggest barriers to achieving interoperability. These are significant concerns, especially those concerning data security, and efforts are being made to address them (see sidebar, “The increasing integration of cybersecurity and privacy”).

Medtech companies should position themselves as solution leaders and invest in developing capabilities and interfaces necessary to integrate data collected from connected devices with other internal and external datasets. Medtech companies should also consider how the data can be made actionable and better integrated into clinical workflows to minimize the burden on those delivering care.

patient satisfaction and safety. Similarly, digital twins are being used to improve surgical outcomes (see sidebar, “Digital twins”). Consider the partnership between Stryker and 3D Systems, which offers a combination of 3D printing, medical imaging, and surgical simulation technologies for a specific procedure. This system provides the surgeon with a clear, 3D visualization of a patient’s anatomy and gives them the opportunity to develop a customized surgical plan before even entering the operating room.<sup>22</sup>

Medtech companies that successfully incorporate some or all of these services can help move the main point of care outside of the acute hospital setting and transition the health sector toward prevention and early intervention, a key shift enabling the future of health. These services also represent a fundamental shift in the traditional medtech business model by pushing companies to compete based on their holistic software capabilities rather than just individual products.

## **DIGITAL TWINS**

The term “digital twin” refers to the digital version of a physical device or process. By bridging the physical and the virtual worlds, data is transmitted seamlessly allowing the virtual entity to exist simultaneously with the physical device or process. Digital twins are emerging as virtual test beds for possible solutions before physical devices are implemented. These computer-based models are fed individual and population data and mimic the electrical and physical properties of an object. Medical device companies are using this technology to simulate how their devices are being used in the clinical setting. By simulating use, device companies can help their provider customers improve their use and clinical workflow, leading to savings.

# Shifting payment and business models

We expect payment and business models for these types of services to change in the future. Medtech companies, for example, might contract directly with hospitals, health systems, and physicians and share in savings achieved through value-based contracts.

**M**EDTECH COMPANIES COULD also get paid for their data through XaaS models and profit sharing. Consider the following example: Philips has entered an 11-year relationship with Jackson Health System for enterprise monitoring as a service (EMaaS)—the first such strategic agreement of its kind. Instead of hospitals purchasing equipment outright, Philips will retain ownership of all current and future hardware, software, and networking solutions. Philips will also provide technical support, continuing education, and asset and data management. In return, Jackson will pay a per-patient fee. The agreement is desirable for the following reasons:

1. Jackson will have access to the most up-to-date monitoring technology without having to purchase any equipment
2. Philips will have access to an unparalleled amount of data which can be used to understand the patient journey, refine products, and expand on service offerings based on needs
3. The clinical experience can be streamlined, giving both staff and customers the best that technology has to offer

Philips has since signed similar agreements with eight other institutions.<sup>23</sup>

*How can medtech companies succeed?* A meaningful give-and-take of expertise between medtech and consumer tech companies could well be the answer. Best-in-class capabilities in data science and AI are core to transformation in the health care ecosystem and currently sit with consumer tech companies. For example, Microsoft recently announced a partnership with OpenAI worth US\$1 billion, to enhance capabilities of its Azure platform and help build the next generation of AI applications.<sup>24</sup> There is a shortage of data scientists and there are a scant 5,400 AI experts in the world, who are in high demand and have even higher salary requirements.<sup>25</sup> Medtech companies haven't made the same scale of investments in AI yet. But they do have deep expertise in the development of medical algorithms, such as translating data from an EKG lead into meaningful output. This expertise is something that is attractive to potential consumer tech partners. Medtech will have multiple considerations for hiring or partnering to get new talent. For example, a medtech industry expert in our crowd said that "Medtech will need to hire not only software developers but innovation gurus, design thinkers, and creativity enthusiasts."

Further, consumer technology companies' data science and AI expertise, combined with medtech's ability to develop meaningful medical applications and algorithms, can create powerful offerings that

## “Medtech will need to hire not only software developers but innovation gurus, design thinkers, and creativity enthusiasts.”

— *Medtech industry expert*

will improve patient health. Consider the example of the Apple Watch® series 4 ECG app. A clinical trial including 400,000 people aimed to assess the

impact of wearable technology on the detection of atrial fibrillation. As part of the study, one-third (34 percent) of participants who received irregular pulse notifications and followed up using an ECG patch for a week were found to have atrial fibrillation. When compared to ECG patch recordings, the pulse detection algorithm had a 71 percent positive predictive value.<sup>26</sup> Apple is now working with Johnson & Johnson to test the app (using Apple Watch® series 4) for individuals aged 65 or older, highlighting the benefits of partnerships between leading medtech and consumer technology companies.<sup>27</sup>

### THE INCREASING INTEGRATION OF CYBERSECURITY AND PRIVACY

The emergence of connected and interoperable devices has brought with it concerns about data privacy, cybersecurity, and patient safety. Wearables, sensors, and other new technologies will likely be an integral part of health care in the future, but where will all that data go? Who will have access and how will it be controlled? And what will ensure that cyberattacks against these medical technologies do not result in harm to the patient? The FDA and other federal government agencies have taken a renewed interest in this topic and have engaged the assistance of medical device manufacturers and other stakeholders within the health care community. For example, in October 2018, the FDA released a revised draft guidance on premarket considerations for medical device cybersecurity.<sup>28</sup> The guidance refines FDA expectations related to the cybersecurity considerations a manufacturer should adhere to during the design and development of a medical device.

Privacy engineering should become a fundamental part of the product development process, and larger, more resilient medical technology ecosystems that can weather cyberattacks should be developed in order to safely bring connected medical technologies into the future. New medical technologies being sold in 20 years are likely to be continuously monitored by AI-driven cybersecurity vanguards, semi-automatically patched to address both scheduled security updates and zero-day vulnerabilities, and designed from the ground up to be resilient to cyberattacks so that the clinical functioning of the device is unaffected. We anticipate that cybersecurity efforts today will be mostly realized in 2040 medical devices (e.g., no hardcoded passwords within the device software/firmware) and supporting ecosystems (e.g., AI-driven ISAOs, device-level identity management, etc.).

# Consumer-centricity can be essential to success

The customers of the medtech industry are evolving from being mostly clinicians and health systems to also include the consumer/patient.

**W**ITH THE EXCEPTION of some therapeutic areas such as diabetes, medtech companies have historically not focused on this population and could benefit from leveraging the access and deep understanding that consumer technology companies have of their consumers. We pick up our smartphones an average of 52 times a day,<sup>29</sup> and 35 percent of US consumers have voice-assistant devices in their homes,<sup>30</sup> allowing these companies to continue to access a significant source of consumer-generated data with implications for decisions about our health.

## Understanding the consumer through vast amounts of data

By virtue of what they are selling, consumer technology companies have the advantage of being closer to their consumers than medtech companies (not to mention more recognizable). Consumer technology companies have access to large amounts of data on their users and can leverage that data to understand details about their consumers. They use digital channels (for example, smartphones and emails) to access our physical location, personal data, purchasing behaviors, and health data—all of which influence health care

outcomes and disease.<sup>31</sup> This provides an advantage to consumer technology companies that medtech companies do not necessarily have. Thus, medtech companies could benefit working with consumer technology companies by pairing data with their own to improve their understanding of the patient journey. Medtech companies should seek inventive methods to remain relevant as engaged, data-savvy consumers become more active participants in care delivery mechanisms.

## Products that fit seamlessly into the care delivery process, including care at home

To fully adopt future medical technology, consumers are likely to demand additional functionality,

**“If Henry Ford was customer-focused, he would have ‘built’ a faster horse ... Being customer-centric, he envisioned a motorized vehicle. The medtech entity of the future must do its homework, research the challenges, and offer life-changing, transformative solutions.”**

— *Health plan expert/executive*



ease of use, and integration with existing devices—much like they do with consumer technology. This is relevant not only for patients, but for providers who prescribe them or look at the data from the device. One current example is the new interoperable insulin pump. This insulin pump can be used with different components that make up diabetes therapy systems, allowing patients to tailor their diabetes management to their individual device preferences.<sup>32</sup> Another example is the Bose hearing aid—the first FDA-approved hearing aid in a new category of products—known as the self-fitting air-conduction hearing aid.<sup>33</sup> No preprogramming or hearing test is necessary. The device is intended for direct-to-consumer sale and use without the assistance of a hearing care professional.

## Barriers remain

The crowd of experts in our simulation agrees that consumers will need a seamless way to interact with their data and “move” their data, as they use various devices. Consumers have much higher expectations due to the ease with which they can interact with consumer technology (their smartphone, voice assistants, etc.). The *Deloitte 2018 Health Care Consumer Survey* found that interoperability (not easily being able to share their data from their device) was one of the top two reasons

consumers were not sharing tracked information with their doctors.<sup>34</sup>

Both consumer technology and medtech companies should build consumer trust with data and privacy concerns. Medtech companies have struggled with consumer trust, despite engaging their customer base (hospitals/physicians/product end-users) throughout the product development process and having a firmer grasp on unmet medical needs. In the Deloitte 2018 Survey of US Health Care Consumers, we found that 35 percent of consumers are willing to share electronic health record (EHR) data (provided their personal identifiable information is protected) with medical device manufacturers, compared to about half who were willing to share that data with their doctor.<sup>35</sup> Organizations will likely need to build trust to encourage consumers to share their data. One way may be to let consumers own their health data. Additionally, companies should be transparent to consumers and give them a clear sense of how their data is being used.

Regarding trust in the actual device, the experts said that medtech companies have the advantage. Medtech companies better understand the regulatory landscape, and it is likely that consumers will demand that products be clinical grade and FDA-approved in the future.

# Leveraging technology and partnerships to improve operations

Advances in technology can help medtech companies improve operational efficiency across the value chain in the near term. Costs could go down and productivity could go up, leading to improved return on investment (ROI) and profitability, freeing up capital to invest in platforms for future growth.

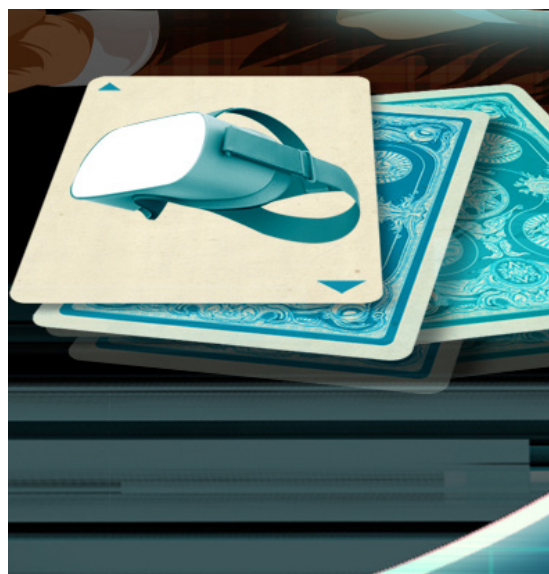
**M**EDTECH COMPANIES SHOULD digitize operations to address inefficiencies and remain competitive. However, it is important that companies focus on simple processes to build early success, before tackling complex processes.

Many companies are looking at digital supply networks (DSN), which integrate the entire supply chain to achieve business objectives, rather than the traditional model where functions work in silos and are managed discretely. Setting up a DSN can require innovative strategies for training the workforce, so that employees develop the required skills.<sup>36</sup>

Two areas are ripe for advances in technology:

- **Inventory and logistics management:** Consider the following example: When a surgery is scheduled by a surgeon/provider, an order for the required equipment is sent to the medtech manufacturer over the cloud. The manufacturer manages a stock location, housing the inventory of equipment. A custom kit, including the required equipment only, is sent

to the provider from the stock location. Kit usage is captured by an app and shared with the medtech manufacturer. Post the surgery, a sterilized kit is returned to the stock location, tagged with radio-frequency identification (RFID). The medtech manufacturer can plan for replenishments based on the RFID-generated data, resulting in optimized management of inventory.



- **Warehouse operations:** AR could be used to reduce human errors and minimize delays in inventory selection, which often relies on paper-based checklists. AR could help workers navigate to the location of the product by charting the optimal route.<sup>37</sup>

As an example, Boston Scientific has automated preregistration processes, form processing, transmission summaries processing invoices, and inventory processing to improve customer service. Apart from monetary savings (US\$240,000), it has resulted in error-free handling of medical data.<sup>38</sup>

Medtech companies might be able to improve operational efficiency by collaborating with consumer technology companies. This strategy is already being used in other areas of the health care sector. For example, Sanofi partnered with Google to leverage AI in identifying consumer behavior patterns, forecast sales, and to find improvement opportunities in marketing and supply chain.<sup>39</sup>

In addition, medtech companies could adopt the agile methodology that consumer technology companies follow. Using an agile approach to set up

operations enables developing requirements iteratively, rather than at the beginning of the project. It also allows companies to make corrections to the development of products based on changing company goals, resulting in smooth functioning of the business.

The crowd suggested that medtech companies could experiment with this type of agility by creating “skunkworks” spinoffs, small and loosely structured spinoff groups that are more agile than the parent company. A medtech industry expert pointed out that consumer technology companies may use this approach to experiment with medtech, “I see [consumer technology companies] leveraging their infrastructure and networks but creating more agile spinoffs to play in the medtech sector. They can back and support their own technology lines to give them a strategic advantage, but their branding is not going to help them in medical technology in general.” However, medtech companies that consider this model should be aware that skunkworks can lead to resentment among some employees if it is seen as too disconnected from the core business.

# New capabilities are required to win in the future of health

Medtech companies should consider what role they would like to play in the future ecosystem: data and platform provider, well-being and care delivery organization, care enabler, or elements of all three.

IN THE NEAR TERM, leaders should identify their company's relative strengths and invest or partner to fill the gaps.

**Invest in data and technology infrastructure:** Medtech companies should consider how to collect and manage data from multiple sources, including connected devices, to strengthen evidence-management capabilities and improve operational efficiencies. A well-defined enterprise architecture structure and capability can be a critical success factor in developing an efficient technology portfolio that supports scalable growth, speed to market, lower total cost of ownership, and increased flexibility. Information sets should be treated as investments and managed like portfolios to leverage indirect insights that expand understanding, deepen relationships, and improve outcomes and efficiencies. The platform will be required to find, organize, and analyze internal and external datasets. Medtech companies could do this best through partnerships.

**Build analytics and AI capabilities:** Data will be generated from multiple sources, and much of it will be unstructured. Companies will need the right tools to make sense of this data. Partnerships between medtech companies and data/consumer tech companies are likely to accelerate to support both data access and analysis. However, traditional medtech companies will likely still need some data

analytics capabilities—a core team that can articulate medical knowledge to the data scientists and other parts of the organization. This team should also help translate the data findings back to the broader organization, so they are not stuck in a “black box.”

**Develop digital well-being and remote monitoring solutions:** Medtech companies might want to invest in remote monitoring solutions to improve remote access to patients in order to help enable the transition to more care outside of the hospital and shift the emphasis toward prevention and maintaining well-being. Specifically, investment in digital therapeutics, such as AI-based wellness coaching, could help enable behavior change that avoids the need for surgery or hospitalization altogether.

**Strategically partner or integrate with providers:** As medtech companies expand service offerings, they could become increasingly integrated with provider systems. Comprehensive solutions, including software, decision-support tools, and consulting services, could help clinicians and health systems achieve their business and clinical goals.

**Get closer to the consumer:** Medtech companies should strive to better understand the needs of the end-user. A more thorough understanding of

## HOW FAST WILL COMPANIES NEED TO SHIFT TO INVEST IN NEW CAPABILITIES AND MOVE THE MARKET?

This is an outstanding question that medtech companies should approach carefully. A 2018 survey of 237 medtech companies by the Deloitte UK Centre for Health Solutions found that 90 percent of companies said they were implementing new business models and operating models. A significant challenge for medtech is whether these new business and operating models will be able to increase revenue and profitability, and if so, how quickly. Furthermore, new entrants are disrupting the sector, which will require incumbents to take significant portfolio decisions (including divestitures of lower-margin segments) and adopt new channels of care (e.g., telemedicine and remote monitoring).<sup>40</sup>

Medtech companies should develop a deep understanding of the end-user and create scenarios that demonstrate how their new and existing devices and services not only improve patient outcomes, but also create value for key health care stakeholders. Furthermore, different types of innovation may require different business models, and progress will likely depend on both the innovators themselves working in new ways to take on risks and rewards, and the evolution of existing payment systems by both public and private payers.

consumer needs could lead to the development of more user-friendly devices, without the intervention of a clinician. Further, they should explore ways to offer patient-centered services in nonclinical settings. Consider Best Buy's Geek Squad—a team of computer technical support professionals that can come into a customer's home and install a TV, fix a computer, or solve any other household technology issue. Could medtech companies offer something similar to support patients who are receiving home care?

Regardless of which path a company chooses, many options are underpinned by the ability to generate and analyze data. In the near term, medtech companies should consider partnering with consumer technology companies to leverage best-in-class capabilities. Consumer technology companies bring technology expertise and offer a deep understanding of consumers and their needs.

Some medtech companies see consumer technology companies as a competitive threat, rather than as potential collaborators. There is some fear that organizations from outside the medtech space might learn key pieces of the intellectual property (IP) and leverage medtech's specialized know-how so that they can develop their own medical devices. While medtech companies should put the right protections in place to protect IP, they should not be reluctant to explore possible collaborations or partnerships. Companies might consider testing the waters by collaborating on one or two specific use cases. Then, examine the bounds of the relationship as pilots succeed or fail. If leading medtech companies do not tap into this partnership model, their key competitors most likely will, giving rise to a sprint toward the MedPod-like future highlighted earlier. It might very well be too late for some, but complacency and the old speed is unlikely to be sufficient in this race to leverage omnipresent data in the future of health.



# Appendix

## Glossary of key terms

FIGURE 3

### Key terms

Term	Description
<b>Augmented intelligence</b>	Helps humans become faster and smarter at the tasks they are performing. It complements human intelligence rather than replacing it (e.g., real-time alerts and diagnostics).
<b>Class I medical device</b>	Devices that have a low risk to the patient (e.g., elastic bandages).
<b>Class II medical device</b>	Devices that have a moderate risk to the patient (e.g., powered wheelchairs).
<b>Class III medical device</b>	Devices that have a high risk to the patient (e.g., heart valves).
<b>Medical device</b>	Any article or health care product intended for use in the diagnosis of disease or other condition, or for use in the care, treatment, or prevention of disease, which does not achieve any of its primary intended purposes by chemical action or by being metabolized.
<b>RWD</b>	Data relating to patient health status and/or the delivery of health care routinely collected from a variety of sources. RWD can come from several sources (e.g., EHRs, claims and billing activities, product and disease registries, patient-generated data including in home-use settings, data gathered from mobile devices).
<b>XaaS</b>	Refers to the delivery of anything as a service or application over the internet.

Source: Deloitte analysis.

## Endnotes

1. IMDRF SaMD Working Group, *Software as a Medical Device (SaMD): Key definitions*, International Medical Device Regulators Forum, 2013, p. 6.
2. Asif Dhar and Casey Korba, *21st Century cures: The future of product innovation and approval*, Deloitte, 2017.
3. FDA, "Consumers (medical devices)," accessed August 22, 2019.
4. *Winning in the future of medtech: Novel partnerships with consumer tech to transform the delivery of care* by the Deloitte Center for Health Solutions is an independent publication and has not been authorized, sponsored, or otherwise approved by Apple Inc. Apple and Apple Watch are registered trademarks of Apple Inc.
5. Michael V. McConnell, "Verily study watch receives FDA 510(k) clearance for ECG," Verily, January 18, 2019.
6. Jeff Dachis, "Automated decision support: One drop can predict blood glucose," One Drop, June 8, 2019.
7. Chris Steel, "Consumer technology & the opportunity for better quality home care at a lower cost," *Becker's Hospital Review*, August 10, 2018.
8. Beyond Verbal, "About us," accessed August 22, 2019.
9. Troy Wolverton, "Former Facebook exec Mary Lou Jepsen said her new company will make telepathy possible. But first, it's going to upend the medical-imaging industry," Business Insider, December 4, 2018.
10. Ruth Reader, "This affordable, portable ultrasound device works with a smartphone," Fast Company, April 8, 2019.
11. DRG, *4 crazy medtech innovations: Shaking up the treatment landscape*, 2019, p. 5.
12. Clare Scott, "Stryker is committing to 3D printing with upcoming multimillion-dollar 3D printing manufacturing facility," 3DPrint.com, January 29, 2016.
13. Axial 3D, "How it works," accessed August 22, 2019.
14. Stryker, "Target guided surgery," accessed August 22, 2019.
15. Scott Hayden, "Surgery training platform 'Osso VR' now used by 1,000 surgeons monthly," Road to VR, July 22, 2019.
16. Esther Landhuis, "Nanosponges sop up toxins and help repair tissues," Science News, March 7, 2019.
17. Sarah Jacoby, "You can now test for BRCA genetic mutations at home—but should you?," *Self*, March 8, 2018.
18. WebMD, "Cholesterol home test kits," accessed August 22, 2019.
19. Modern Fertility, "The science behind ovarian reserve testing," March 21, 2018.
20. Shaping Our Future Wellbeing, "Breakthrough in microneedle technology at the MediCentre," March 29, 2019.
21. Seventh Sense Biosystems, "Next generation blood collection," accessed August 22, 2019.
22. Sarah Saunders, "3D Systems and Stryker partner up for virtual surgical planning distribution partnership," 3DPrint.com, January 7, 2018.
23. Philips and Jackson Health System, "Philips and Jackson Health System sign groundbreaking 11-year agreement for Enterprise Monitoring as a Service," June 27, 2018.

24. Abigail Opiah, "Microsoft to invest \$1bn in OpenAI to build Azure AI supercomputing technologies," Data Economy, July 29, 2019.
25. Fedor Karmanov and Simon Hudson, *Global AI talent pool report 2018*, JFGAGNE, 2018.
26. Tracie White, "Stanford, Apple describe heart study with over 400,000 participants," Stanford Medicine, November 1, 2018.
27. Conor Hale, "Apple, J&J to put the Apple Watch's ECG through large-scale clinical testing," Fierce Biotech, January 17, 2019.
28. FDA, *Content of premarket submissions for management of cybersecurity in 2 medical devices*, October 18, 2018.
29. Deloitte, *2018 Global Mobile Consumer Survey: US edition*, 2018.
30. David Betts and Leslie Korenda, *Inside the patient journey: Three key touch points for consumer engagement strategies*, Deloitte Insights, 2018.
31. Gabe Turner, "The data big tech companies have on you (or, at least, what they admit to)," Security Baron, March 25, 2019.
32. FDA, "FDA authorizes first interoperable insulin pump intended to allow patients to customize treatment through their individual diabetes management devices," February 14, 2019.
33. *Hearing Review*, "FDA approves first self-fit hearing aid; grants 'De Novo' status to Bose hearing aid," October 5, 2018.
34. David Betts and Leslie Korenda, *Inside the patient journey: Three key touch points for consumer engagement strategies*, Deloitte Insights, 2018, p. 10.
35. *Ibid*, p. 9.
36. Deloitte, *The digital era in the medtech industry*, 2018.
37. Danielle Kirsh, "Gaining a competitive edge with digital manufacturing," Medical Design & Outsourcing, January 9, 2017.
38. Eyeforpharma, *Pharma's transformation through automation*, accessed August 22, 2019, p. 10.
39. Erin Dietsche, "Google, Sanofi use technology to better understand diseases and treatments," MedCity News, June 19, 2019.
40. Karen Taylor et al., *Medtech and the internet of medical things*, Deloitte, July 2018.

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