



Medical devices 2030

Making a power play to avoid the commodity trap

Thriving on disruption series

While the outlook for medical device companies appears positive, unsustainable healthcare costs and new competitive forces threaten to alter the future industry landscape. If today's manufacturers fail to stake their claim in the evolving value chain, they risk being caught in the middle and becoming commoditized. Staying ahead means offering value beyond the device and solving healthcare's problems – rather than contributing to them.

Roger van den Heuvel

KPMG in the US

Chris Stirling

KPMG in the UK

Anuj Kapadia

KPMG in the US

Jia Zhou

KPMG in China

Global Strategy Group

KPMG International

Medical devices in 2030 – being part of the solution

Reinvent, reposition, reconfigure!

The days of simply manufacturing a device, and selling it to healthcare providers via distributors, have long vanished. Value is the new byword for success, prevention the preferred clinical outcome, and intelligence the new competitive advantage. In this paper we discuss the pathway to success in 2030 for medical device companies, following a three-pronged strategy:



Reinvent

Medical device manufacturers should take a closer look at their existing organizations and reinvent their traditional business and operating models to adapt to the future, by:

- integrating intelligence into their portfolios and offerings, to positively influence the care journey and **connect with customers, patients and consumers**
- delivering services beyond the device, and intelligence beyond these services – a true **shift from cost to smart value**
- **investing in enabling technology** – making the right choices to support a wide range of parallel business models tailored by segment to customers, patients and consumers (prospective patients) – and, ultimately, the financial ambition for the organization.



Reposition

It is equally important to prepare for the future by considering an 'outside-in' perspective.

In 2030, the external environment will be extremely dynamic and medical device companies need to reposition themselves in the newly envisaged competitive landscape, to cope with tumultuous forces from:

- **new entrants**, including competitors from unrelated industries
- **new technologies**, as technological innovation will continue to outpace clinical innovation
- **new markets**, as developing countries continue their high growth trajectories.



Reconfigure

The traditional medical device value chain will rapidly evolve, and by 2030 companies will take on significantly different roles. Following their reinvention and repositioning, medical device companies will need to reconfigure their respective value chains and define their place therein. Multiple value chain 'configurations' will exist, requiring companies to make fundamental strategic choices. As somewhat evidenced today, manufacturers will continue to link themselves directly with patients and consumers, or combine with providers or even payers through vertical integration. Value chain reconfiguration choices will not be straightforward, and are likely to differ by company segment (device area, business unit, geography). This will be further complicated by the fact that the value chain itself will be dynamically evolving, as a result of other companies attempting to reconfigure and meet their strategic aims. The right choices, however, will create significant value for the end user – and help the company avoid a future of commoditization.

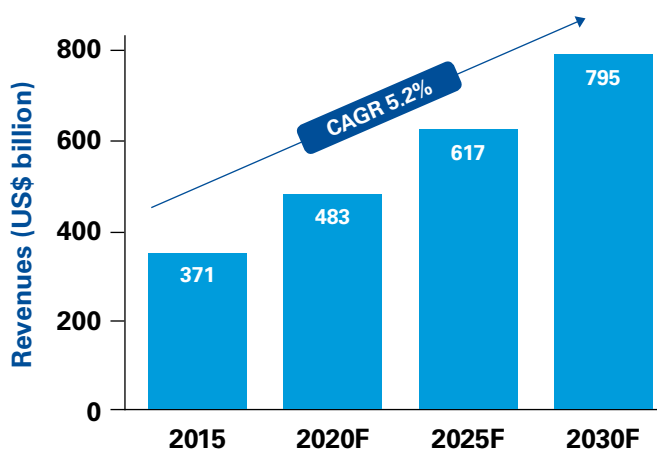
Industry executives need to challenge conventional thinking, and reimagine the roles their companies will play in 2030. Accordingly, they will need to reconfigure today's organization to shift from being a participant in the value chain to being a solution provider for sustainable healthcare costs.

Don't get stuck in the middle

Unbearable pressures disrupt the status quo

The medical device industry is poised for steady growth, with global annual sales forecast to rise by over 5 percent a year and reach nearly US\$800 billion by 2030¹. These projections reflect increasing demand for innovative new devices (like wearables) and services (like health data), as lifestyle diseases become more prevalent, and economic development unlocks the huge potential in emerging markets – particularly China and India.

Global medical device sales forecast to 2030²



Despite these apparently attractive prospects, a shadow hangs over the sector in the form of a relentless downward pressure on pricing. Governments around the world are desperately trying to reduce the cost of healthcare – especially in the most expensive part of the system: hospitals. They want to pay less for medical devices and see proof of greater value in terms of better patient outcomes.

Responsibility for many purchasing decisions has already moved from clinical to economic buyers. Short-term respites like the 2-year US excise tax moratorium on medical devices notwithstanding, pricing appears to be going in one direction only – down. Further uncertainty lies ahead, with the new European Medical Device Regulation in 2020 and regulations in China that are designed to spark local innovation.

These developments present a quandary for medical device companies that have historically concentrated on manufacturing and research and development (R&D), but are now seeing healthcare budget restrictions and new reimbursement regimes continue to snip away at margins. On top of this, new players – some from entirely different industries – are disrupting the sector by harnessing data to take ownership of customers, patients and consumers. In this volatile new marketplace, today's device players are in serious risk of being stuck in the middle of the value chain, as mere commodity producers.

The evolving value chain

Making a power play across the medical device value chain of the future

Traditionally, medical device companies have delivered value primarily through manufacturing and selling their products. But as pressures on the healthcare system mount, there are foundational shifts in the care delivery model, and as a result, the industry value chain is up for a drastic overhaul.

Medical device companies will ultimately seek to play a larger role in the value chain and get closer to customers, patients and consumers. Done right, this will not only add new revenue streams for them, but also contribute to shorter, cheaper, and fewer hospital visits – and thus lower healthcare costs.

In the new normal, companies will need to step out of their conventional manufacturing role. Services and data intelligence will need to be integrated with products to offer holistic solutions, requiring a 'power play' across the value chain – strengthening existing business-to-business (B2B) plays and creating new ones, while introducing business-to-consumer (B2C) plays. These power plays will likely include a continuous slew of deal activities – mergers and acquisitions (M&A), strategic alliances and partnerships.





It's not just about the device

By 2030 the leading medical device players will be those that play an active role in delivering value by connecting with customers, patients and consumers (end users). This will require a shift from treatment and cure to prevention through integrated 'smart' services and solutions that bring down the cost of care and improve outcomes. Technology will have a significant impact, resulting in prevention and, if still necessary, highly efficient, minimally invasive treatment options that decrease the time spent in hospital.

Medical device companies will need to carefully evaluate their business and operating models in order to deliver value beyond the device in 2030, keeping in mind the following trends:

Connect with customers, patients and consumers

In a bid to get closer to the end user, manufacturers now, more than ever, should leverage data and build intelligence into their products – it is fast becoming an essential part of the new device value proposition. Data and analytics allows companies to directly and continuously connect with users, placing prevention ahead of treatment and cure, and giving patients greater control over their care. To quickly enhance their technology capabilities and effectively introduce smart offerings to their portfolio, medical device companies may consider partnerships with other players.

We are already witnessing 'first time' collaborations in the industry proving this concept. Zimmer Biomet has partnered with technology platform provider HealthLoop to support patients awaiting joint replacement³. HealthLoop's patient engagement app educates patients with pre-to-post-operative protocols, and collects data on outcomes and post-surgery therapy, to help estimate reimbursement costs. Philips has taken a different approach towards targeting the end user. Through its digital healthcare platform, Philips HealthSuite, the company aims to increase market share in a range of segments as wide as healthy living, prevention and diagnosis, treatment, recovery and home care. The cloud-based platform uses Internet of Things (IoT) technology to collect and analyze data from multiple devices, and could ultimately support hundreds of millions of interconnected patients, devices and sensors.

We are in the midst of one of the most challenging times in health care history, facing growing and aging populations, the rise of chronic diseases and global resource constraints, and the transition to value-based care. These challenges demand connected health IT solutions that integrate, collect, combine and deliver quality data for actionable insights to help improve patient outcomes, reduce costs and improve access to quality care.

– Jeroen Tas,
Chief Innovation and Strategy Officer, Philips⁴

With devices increasingly being used in the home, or, in the case of wearables, at all times, the relationship with end users changes dramatically. Clinicians receive intelligence to help them diagnose, monitor and prevent diseases, while patients avoid unnecessary (and expensive) clinic or hospital trips, and both patients and consumers can access valuable advice on lifestyle and diet. In 2016 the number of patients being monitored remotely grew by 44 percent and is projected to exceed 50 million by 2021⁵, while the global market for remote patient monitoring devices is expected to reach US\$1.9 billion by 2025⁶.

Manufacturers are also integrating intelligence into their devices, offering real-time insights based on patient data. AliveCor has developed a medical-grade electrocardiogram (ECG/EKG) band, which can be used by smartwatch wearers to detect cardiac arrhythmia conditions causing stroke and measure heart rate and rhythm⁷. The band works with a smart app that processes the data from device sensors, and allows its wearers to record voice memos to be sent along with the ECG/EKG to their doctor. And Portable Medical Technology has developed an app that is CE approved (EU certification) for conformance as a medical device⁸. Called ONCOassist, it offers clinical decision support tools for oncologists providing a suite of prognostic and adjuvant tools for breast cancer, colon cancer, lung cancer and gastrointestinal stromal tumour.

Although these developments generate vast amounts of useful data, the key challenge for device companies lies in how to monetize this information. Revenues from consumers themselves are likely to be minimal as they increasingly see such information as a given and are not prepared to pay for it. It will therefore be necessary to

work with payers to achieve effective commercialization, and tangibly demonstrate how connectivity is bringing down healthcare costs. Furthermore, the care setting will move from away from the hospital and into the homes of patients and consumers. As a result, the customer base for medical device companies is expected to significantly alter and require a fundamental change of their commercial operating model, such as the impact on their future salesforce.

The proliferation of data also poses another grave threat to the industry in the form of cybersecurity risks. Their connected nature makes certain medical devices especially prone to hacking, and companies need to adhere to stringent standards to ensure patient privacy and safety. Following a spate of cyber-attacks, the US Food and Drug Administration (FDA) has recently issued specific guidance to handle vulnerabilities, in the form of *Postmarket management of cybersecurity in medical devices*⁹.

Risks notwithstanding, companies should be seeking new methods and means of collecting data, in order to build smart devices and connect with the end user. As preventative and personalized care becomes the new treatment, technologies that support behavioral changes in patients and influence positive lifestyle changes will be in high demand going forward.

Shift focus from cost to value

Although margins in services may not currently be as high as those in pure device manufacturing, companies that do not integrate value added offerings to their portfolios risk giving up market share, and competing in a commoditized market.

Already, more and more medical device manufacturers are offering a range of services supplementing the product. Fresenius Medical operates a chain of 3,690 dialysis centers, making them a global leader in both manufacturing (with 50 percent of all hospital dialysis machines worldwide) and clinic operations (as of June 2017, the company treated over 315,000 patients)¹⁰. And with its US\$2 billion deal to acquire US home dialysis equipment maker NxStage Medical Inc., Fresenius is aiming for a big role in the growing home treatment market¹¹.

Siemens has rebranded its healthcare business as 'Siemens Healthineers'. Over the last quarter of 2017, Siemens Healthineers was the largest segment for the global conglomerate, with sales of over

US\$4 billion, as well as the most profitable one, with 19% margins. These high margins are largely attributed to their innovative service offerings, which include managed services, consulting and technology solutions¹². They are doing this by entering into strategic alliances and partnerships. One recent agreement with Turkish hospitals is focused on managing their clinical laboratory service operations, and is expected to benefit more than 92 million patients over the next five years.

This project combines our expertise in equipping laboratories with our service portfolio. It is a milestone for us and, at the same time, also a proof point for how we enable our customers to meet their current challenges and to excel in their respective environments. The new business model is designed to support our customers in increasing efficiency and containing costs right from the beginning.

– Bernd Montag, CEO, Siemens Healthineers¹³



Siemens Healthineers has also entered into a strategic alliance with IBM Watson Health, focusing on population health management and value based healthcare solutions for hospitals¹⁴. This partnership will allow Siemens to leverage its imaging business and clinical solutions and analyze the volume of data generated by medical technology to better understand diseases.

Although many companies have established their services businesses as separate entities, we see these being folded in over time as they become part of a truly integrated core offering.

Additionally, services and intelligence will drive concepts like value-based pricing from hype to reality. In a cost contained healthcare system, manufacturers are already dealing with economic buyers in addition to clinical buyers, and there is a clear need to balance innovation with value. For each device area in their portfolio, companies must define what value means to each of their stakeholders – payers, providers, patients and even consumers to a certain degree. This will allow them to identify opportunities for enhanced product differentiation through broader customer solutions, complementary services and value-focused smart devices. This in turn will drive significant portfolio decisions (including divestitures of lower margin segments) as well as channels for care (online, telemedicine, remote monitoring, etc.). The need to demonstrate robust clinical and economic data will mean that by 2030, value-based pricing and innovative risk sharing contracts will be the norm for medical device manufacturers.

To successfully collect and report meaningful, measurable outcomes data, medical device companies should invest in a digital strategy and technology infrastructure that allows them to clearly link data with the device, consistently define outcomes and increase transparency across healthcare stakeholders. For this to really work, the starting point should be the user experience and corresponding pain points rather than the device, so 'user-back' instead of 'device-forward' – a perspective that may be new to traditional players, but familiar to technology entrants.

Reinvention may not come naturally to all medical device companies, with the need to make business and operating model choices that will be fundamentally different by 2030. Additionally, each company segment and geography will need to be individually evaluated – choices for orthopedics will differ from those for diagnostic imaging, as will those in the US compared to China. Companies will need to carefully research the care journey for each device area and in each market they operate in, to determine what their future business should look like.

A case study in reinvention: Medtronic

Medtronic has taken bold steps in recent years, cementing its status as the world's largest medical device company. By embracing reinvention, the company continues to make fundamental shifts in its global business model.

Connecting with customers, patients and consumers

Medtronic has partnered with Fitbit to integrate health and activity tracking for patients living with diabetes¹⁵. A mobile app collects data from continuous glucose monitors and Fitbit activity trackers – enabling patients to manage their glucose levels, and physicians to optimize therapy. The app also provides meaningful insights on how exercise impacts glucose levels. In another notable partnership, Garmin's wearable device data is to be integrated into Medtronic's remote patient monitoring mobile application. This will not only enable self-care for patients, but also allow physicians to better manage patients' health at home and thus reduce hospital stays¹⁶. Additionally, through its partnership with IBM Watson, Medtronic has developed a diabetes management app, Sugarwise, which links with glucose meters and insulin pumps to predict hyperglycemia, and encourages food choices based upon their impact on the patient's body¹⁷.

Shift from cost to value

Medtronic's Integrated Health Solutions (IHS) business develops long-term partnerships with hospitals, physicians, payers and health systems. It provides managed services for specialized care

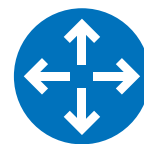
settings such as cath labs, operating rooms and intensive care units (ICUs), as well as chronic conditions. Partners include global healthcare providers such as University Hospital of South Manchester, University Hospitals Cleveland Medical Center and Atlas General Hospital in Serbia^{18 19 20}. IHS also offers educational programs for healthcare professionals and consulting services to patients.

Additionally, Medtronic has created a 'direct to consumer' e-commerce platform called Nayamed, selling simple (and perfectly functional) pacemakers and defibrillators in certain cost-sensitive European markets. Instead of having multiple settings for physicians to manage, the devices adjust to a patient's heartbeat and configure themselves. The units are only sold online, and physician and nurse training and support is delivered virtually, helping Nayamed contain costs while delivering unique value²¹.

To address global challenges and help healthcare system leaders deliver better value for money, Medtronic is transforming and broadening its presence from devices alone to technologies, services and solutions that encompass the entire patient-care continuum. We can help providers and payers adopt value-enhancing innovations to ensure affordable healthcare²².

– Frederic Noel, Vice President, Hospital Solutions, Medtronic

Reposition



A new competitive landscape

The competitive landscape for medical devices in 2030 is poised to look completely different than it does today, thanks to new and non-traditional entrants, disruptive technologies, and players with global ambitions emerging from high growth markets.

New entrants

The often-mentioned, ubiquitous forces of disruption are hard at work in healthcare, a trend that is likely to continue to 2030. Driven by the need to support quality care at lower costs, the medical device sector is likely to see continued entry of new players from all industries over the coming decade. By utilizing technology, it is very likely that these new competitors could cause redundancies in the value chain of today – just like other platform businesses have done already.

E-commerce giant Alibaba has already entered the market, leveraging their vast logistics capabilities and huge customer base²³ (please see pages 16-17 for the 'New markets' section and 'Rise and Rise of China in the global medical device industry'). US-based online retailers are set to follow this example, with some companies featuring a vast selection of medical supplies like infusion pumps, catheters, IV bags, sutures, forceps, hospital beds, scalpels and other lab items. They could undercut margins by as much as 20 percent, putting pressure on established medical supply distributors and manufacturers. Over time, it is expected that these new entrants will overcome regulatory barriers and move upmarket to sell higher-end products – we are already witnessing this trend in the pharmacy segment. Additionally, some of these businesses are partnering with life sciences and genomics companies and hiring their own healthcare experts, signaling their intent to create new value propositions for patients and consumers.

By capturing and analyzing data from smart devices, new competitors are entering the arena, offering ways to measure performance and outcomes more accurately, and ultimately improve diagnosis and treatment. To illustrate this, several companies are working on smart eye lenses and smart inhalers that wirelessly transmit information to smartphone apps, and to physicians through the cloud. A prominent technology company has even gone on record stating their wearable device will become the 'holy grail' in healthcare. Established companies should be wary of dismissing such new offerings as mere loss-leaders, and reflect on how incumbents in other sectors have been superseded or sidelined by new, intelligence focused companies. Although technology companies are likely to pose the greatest competitive threat, new entrants could also emerge from unexpected industries such as gaming, from players that are willing to forgo profits in order to establish market share.

There is plenty of room for collaboration in this space, as traditional medical device companies can marry their clinical expertise with innovative offerings from other players. Johnson & Johnson has partnered with a leading technology company, adopting their 3D printing capabilities to develop customized orthopedic products, leading to better healthcare outcomes while reducing costs. Google has collaborated with Ethicon (subsidiary of Johnson & Johnson) to start a new venture company called Verb Surgical – they are developing safer, cost-effective and smarter surgical robots that use artificial intelligence software for image data analysis and machine vision²⁴.

Consolidation and vertical integration are also ways in which healthcare companies are attempting to create bundled offerings for patients and consumers, and increase their relevance in the new external environment. For instance, CVS Health's proposed US\$69 billion bid for Aetna could result in more efficient and effective health

coverage by combining health insurance plans, care services and retail pharmacies all in one entity – as well as help them ward off the “e-threat” of online pharmacies²⁵.

In order to combat the growing challenge from new players, device manufacturers need to think more broadly than existing revenues, and take a step back to understand how the 'pie' itself is changing. They need to not only harness data from devices, but turn it into intelligence. And they must keep abreast of the competitive landscape, instituting a robust process to monitor disruptive trends and identify strategic partners. Coopetition – alliances with competitors – could well be the business model of choice for many medical device companies in 2030.






New technologies

Technology has the potential to both propel and disrupt the medical device industry, with exciting new developments emerging at a previously unimagined pace. Making the right bets will not be straightforward, and companies will need to carefully evaluate, and experiment with, a constant stream of innovations. We believe that the following five technologies will help embed intelligence into the portfolio, and hence be widely adopted by winning companies in 2030: wearables, smart device apps, IoT, cloud-based data and analytics, and blockchain. Collectively, we call these 'Patient and consumer data sharing technologies'.

Blockchain

Blockchain's potential for medical devices may be as great – or even greater – than its impact on the global financial services sector. Preventative maintenance of devices, a strengthened manufacturing process, digitized business processes and 'smart contracts', enhanced safety measures and evidence for value-based payments – these are just a few ways blockchain can disrupt the industry across the product lifecycle. Several

life sciences companies are already investing in blockchain capabilities. Gem, a US-based startup, has partnered with Philips Healthcare to launch Gem Health²⁶, a network for developing applications and shared infrastructure for a patient-centric approach to healthcare. Companies that are early adopters of this breakthrough technology could potentially enjoy significant first mover advantages in 2030.

|  Clinical |  Regulatory Approval |  Manufacturing |  Distribution |  Marketing |
|--|--|--|--|---|
| Patient enrollment e-Consent Trial Documentation Data sharing | Data sharing & tracking Verification – smart contracts Records management – methods & results IP registration and exchange Proof of existence for patents filing | Smart contracts with CROs, CMOs, etc. Manufacturing process control Payment transactions across supply chain Regulatory compliance requirements | Digital track and traceability Counterfeit protection Inventory management systems Effective & efficient targeted recalls Payment transactions across supply chain | Smart patient health profile Connected ecosystem Secure medical device data Preventive device maintenance Healthcoin and health insurance |

Technology innovation at an unprecedented pace

Patient and consumer data sharing technologies will be further complemented by a host of innovations across the following medical device categories:

Innovative surgical interventions like autonomous surgical robots and intelligent balloon catheters will enhance outcomes of complex surgeries and enable new forms of minimally invasive surgeries. Stryker has placed large bets in this space, given their strong orthopedics focus. In March 2017, the company launched the robotic-arm assisted total knee arthroplasty application for use with its Mako robot system. The technology is the first of its kind for total knee replacement, gained FDA approval in 2015 and is now commercially available for use in the US²⁷.

Ingenious diagnosis and imaging will utilize DNA, nanobots and Artificial Intelligence (AI) to speed up diagnosis, imaging and importantly, subsequent care decisions. Some of the aforementioned new entrants will be at the forefront of introducing AI into healthcare delivery. Already, Google is working on using deep learning, a branch of AI to recognize patterns in a huge number of digital representations of images in order to detect signs of cancer in breast cancer biopsies²⁸. The technology is still in its nascent stage of R&D but has the potential to make a big impact on the imaging segment.

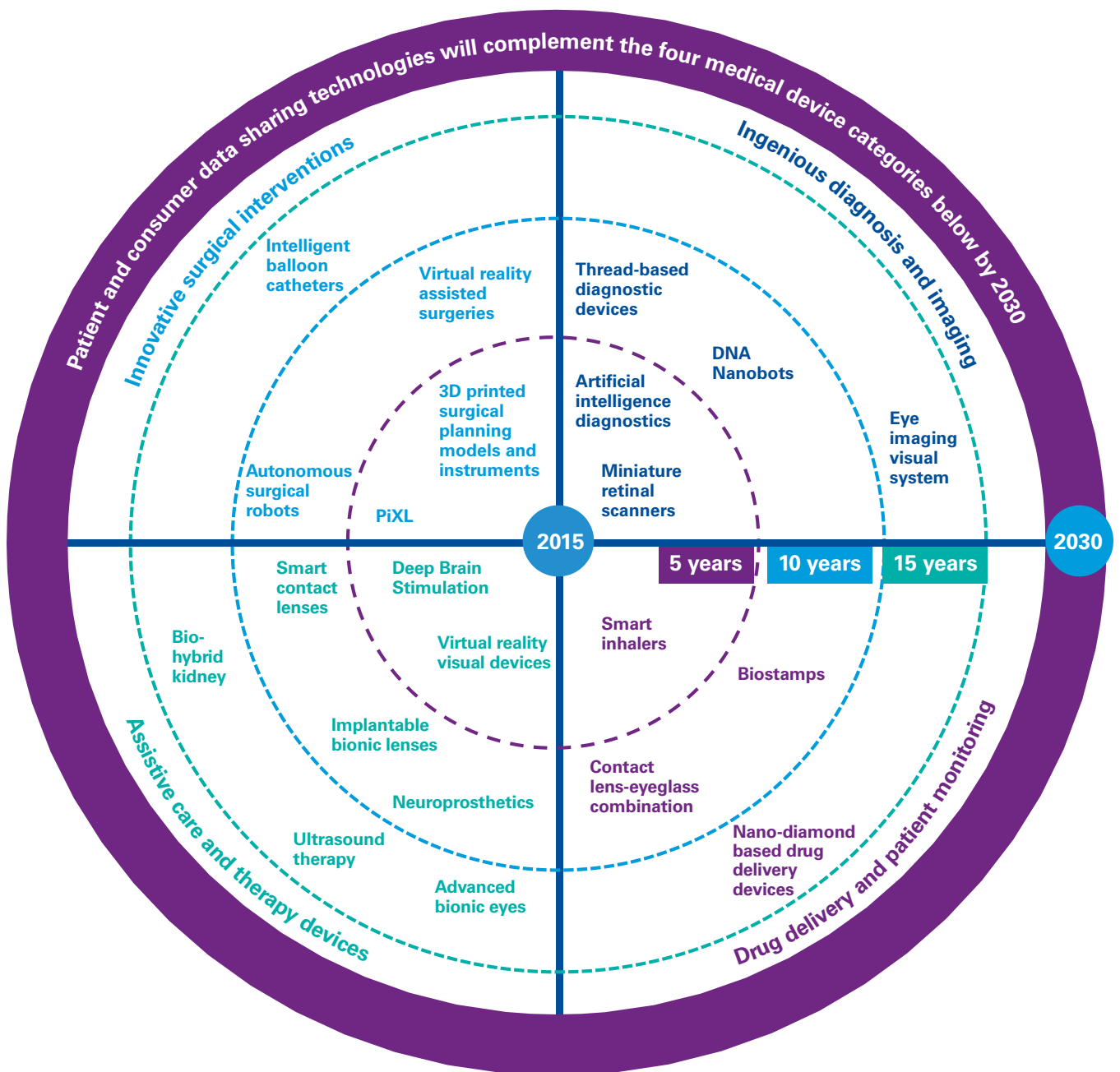
Drug delivery and patient monitoring will personalize and minimize invasiveness of drug delivery, through devices like biostamps and smart inhalers. Several pharmaceutical and technology companies are currently

developing connected inhalers. These smart devices will not only send the patient medication reminders (thereby improving adherence) but also transmit data to their physicians, enabling more personalized and preemptive care. Novartis has partnered with Qualcomm Life to develop an internet-connected inhaler (known as the next generation Breezhaler) that can send information to a cloud-based big data analytics platform which healthcare providers can use to treat patients with chronic obstructive pulmonary disease (COPD). The company plans to launch the Breezhaler in 2019 following manufacturing, testing and regulatory approval²⁹.

Assistive care and therapy services – like the bio-hybrid kidney – will minimize the need for certain services (e.g. dialysis) and also reduce many of the patient risks associated with today's systems. Researchers at the University of California have developed a first prototype of an artificial implantable kidney the size of a coffee cup. It contains microchip filters developed by silicon nanotechnology and living kidney cells that will be powered by a patient's own heart, further ensuring a zero percent chance of organ rejection³⁰.

These are just some of the many exciting ways in which technology will impact the medical devices sector by 2030. Deal strategies over the coming decade should therefore include cross-sector opportunities, to identify winning partnerships that can radically transform healthcare delivery through better care at lower costs.

Medical Devices Technology Roadmap to 2030



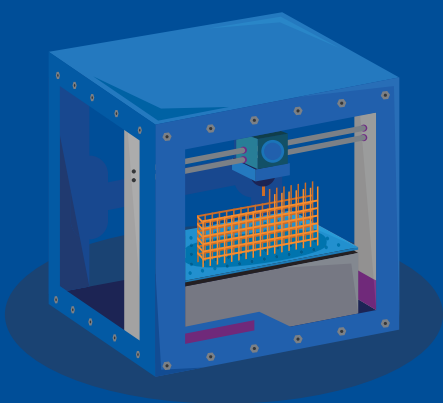
Technology expands medical device companies' role in the care journey

New technologies do not only produce efficiency, savings and better outcomes for providers and patients; they also help medical device companies play a wider role in the care journey, through improved prevention, diagnosis, treatment and care.

































Companies will leverage technological progress to better connect with customers, patients and consumers and provide them with intelligence-powered solutions across all major medical device segments.

Over the coming decade, we expect the care journey for most medical device categories will be fundamentally altered with the introduction of numerous innovations. Treatment protocols will significantly evolve, enabled by advances in technologies such as 3D printing and Augmented/Virtual Reality, and the launch of several 'smart' devices. Developments in areas such as AI will result in improved diagnosis and care options, driving down healthcare costs. Ultimately, as time spent in the hospital is reduced, the focus will shift to preventative technologies - an area with exciting promise for the future.

The table on the following page highlights how different technologies will impact the care journey across multiple device areas.



Future impact of innovative technologies across the care journey

| | Prevention | Diagnosis | Treatment | Care |
|--------------------------------------|---|---|---|---|
| Innovative surgical intervention | Autonomous surgical robots/ Robotic eye surgery | |  | |
| | 3D printed surgical planning models and instruments | |  | |
| | Augmented reality assisted surgeries | |  | |
| | Intelligent balloon catheters | |  | |
| | Photorefractive intrastromal cross-linking | |  | |
| Ingenious diagnosis and imaging | Artificial intelligence |  |  | |
| | Thread-based diagnostic devices | |  |  |
| | DNA nanobots | |  |  |
| | Eye imaging visual systems | |  |  |
| | Miniature retinal scanners | |  |  |
| Drug delivery and patient monitoring | Biostamps |  | |  |
| | Smart inhalers | |  | |
| | Nanodiamond based drug delivery systems | |  | |
| | Contact lens-eyeglass combination | |  |  |
| Assistive care and therapy devices | Leadless pacemakers | |  | |
| | Neuroprosthetics | |  | |
| | Bio-hybrid kidneys | |  | |
| | Deep brain stimulation |  | |  |
| | Ultrasound therapy | | |  |
| | Implantable bionic lenses/ Advanced bionic eyes |  | |  |
| | Smart contact lenses |  | |  |
| | Virtual reality devices | | |  |

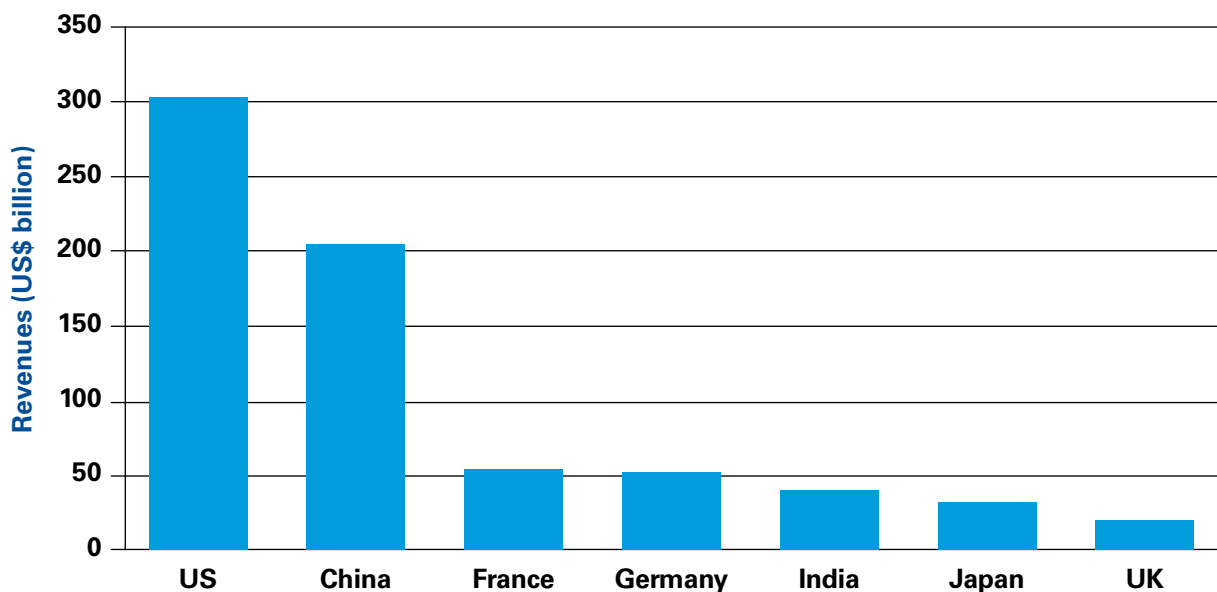


New markets

Although the US will continue to dominate the medical device industry in 2030, crossing US\$300 billion in sales³¹, the top five markets will also include China (in second place, with more than 25 percent of the global market at over US\$200 billion³²) and India (fifth largest, with over US\$40 billion in revenues³³). China and India are already growing at twice the pace of the overall market, driven by healthcare reform, local government incentives and overall rising demand for healthcare^{34 35}. Both countries are also fast becoming innovation hubs – India is already known as the global center for frugal engineering, producing a number of indigenous (and low cost) devices with global market potential.

The diverse nature of different emerging markets calls for individual entry strategies tailored to specific in-market needs. Key success factors include localizing innovation and manufacturing, adapting to country-specific distribution models and sales channels, investing in local technology infrastructure and collaborating with domestic value chain stakeholders. Medical device companies will need to be prepared to invest for the long run, adding complexity and uncertainty to their expected pay-offs – but inaction could see them missing out on potentially lucrative opportunities. While China and India are obvious choices to establish and strengthen presence, other markets should consistently be evaluated as they continue to grow over the coming decade.

Top 7 global medical device markets by forecast revenues in 2030³⁶⁻⁴²



Rise and rise of China in the global medical device industry

Boosted by favorable regulations and local incentives, Chinese medical device players have expanded significantly in the past 5 years, growing at a double digit annual rate. Domestic companies account for approximately 70 percent of market share (in 2016), and span all segments – IVD, diagnostic imaging, cardiovascular, nephrology, orthopedics, hearing aids and even wearables⁴³. Larger companies are now turning their attention to the world stage, with ripe potential for M&A activity.

The Chinese government has laid out multiple initiatives to support long-term growth and innovation in healthcare delivery, but the policy landscape is in constant flux and needs ongoing monitoring. That said, we expect future regulations (13th Five Year Plan, Healthy China 2030, Made in China 2025) to continue to favor local innovation, and thereby fundamentally alter the competitive landscape. Additional complications, such as the recent introduction of the ‘Two Invoice Distribution’ model have considerable implications for multinational companies in China⁴⁴.

Technology will play a huge role in healthcare, with several internet giants in the country that are already making inroads. As online medical sales continue to grow, Alibaba has opened many internet pharmacies, offering medical devices through their platforms⁴⁵.

They are also attempting to push the application of AI in diagnostics and healthcare, to make medical treatment more accessible, timely, and affordable. Through its cloud subsidiary, the company is actively working on AI-powered solutions to tackle healthcare problems not just in China but also globally. Other large companies are also looking to participate in China’s growing market. Baidu has launched a doctor app where patients can get consultations and work with doctors online⁴⁶ and Dalian Wanda group has branched out into hospital operations to tap into the rising demand for private healthcare⁴⁷. The Internet of Medical Devices will further drive smart penetration in China, encouraging both patient adherence and preventative care through remote monitoring.

As the local market transitions quickly from ‘frugal manufacturer’ to ‘innovation hotbed’, many companies are vying for a share of the high-growth medical device market. Consequently, multinationals need to consider how to contend with local technology firms holding distinct competitive advantages and better access to data intelligence. Complications aside, medical device companies simply cannot ignore China’s growth potential – they will need to continue making local investments and partnerships to carve out their share in this massive market, in order to remain relevant in 2030.

Reconfigure



Staking a claim in the future value chain

With the market evolving ever faster, incumbents need to consider their positions in the 2030 medical device value chain, to avoid becoming commodity providers. Even the strongest and largest players are vulnerable to disruptive entrants, global competition and technological leaps. With a firm focus on the value they bring to future health systems, medical device manufacturers

need to consider brave, but essential, power plays to reconfigure their value chain. Different segments of the business are likely to require different value chain configurations, necessitating a careful evaluation and alignment of options. We believe several configurations will exist by 2030, including the following:

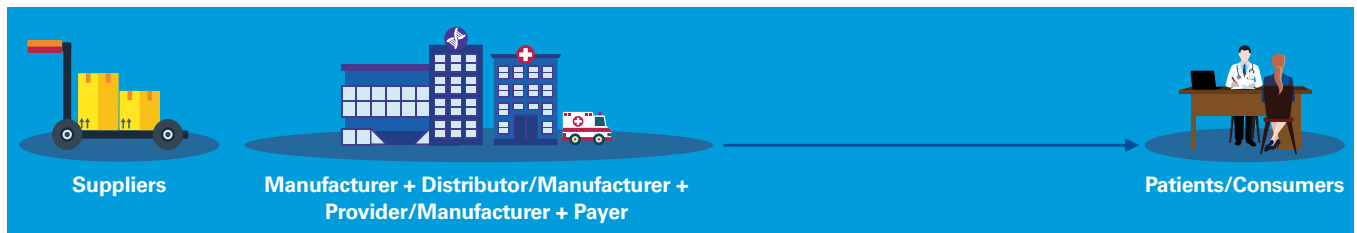
1. Creating a new B2C play



This configuration involves connecting directly with patients and consumers, bypassing other value chain players and offering intelligence that promotes self-diagnosis and preventive care. The shift to the consumer is enabled by digital health solutions including wearables, mobile applications and remote monitoring. Intelligence and ease of access will be the key differentiators, enhanced through non-traditional partnerships with businesses like healthy food companies, fitness and sporting firms, and gaming companies. Ultimately, as the device by itself becomes a commodity, smart data will be ever more critical with interoperability and integration as driving factors.

Given that the B2C play is unexplored territory for most medical device companies today, they will need to be open to experimentation. Partnerships with companies who have closer existing connections with patients and consumers (both within and outside the healthcare ecosystem) may be an avenue towards this configuration. However, in addition to a shift in mindset, medical device leaders should be willing to invest in this customer-centric approach (and not focus on immediate returns), while simultaneously enhancing their core B2B businesses. The mantra of 'move first, monetize later' is likely to pay off in the longer term as the value of intelligence as a core offering is realized.

2. Strengthening and consolidating the B2B play

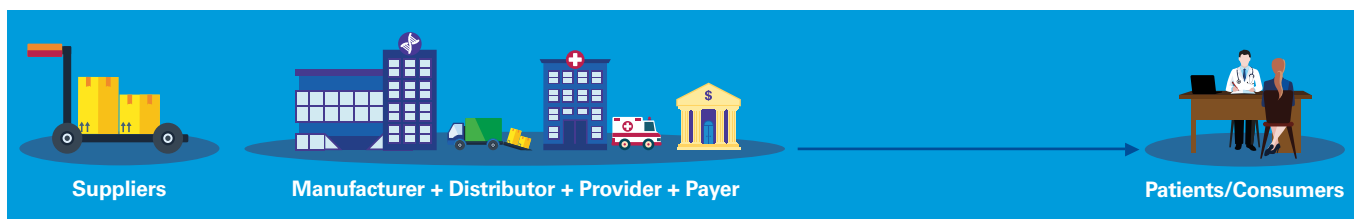


These companies will shift their influence across the value chain, through strategic alliances with, or acquisitions of, healthcare providers, distributors, and even payers. Higher levels of convergence in the industry will result in increased deal activity and vertical integration, with companies seeking to control a greater number of end user touchpoints in the care journey.

Creative deal-structuring will be key to this configuration, supported by robust data and analytics capabilities that translate into value for the entire

health network. Medical device companies will need to be willing to bring more to the table in terms of services and intelligence for their value chain partners, in exchange for increased influence across the care journey. Relationship management will be critical in order to achieve the desired outcomes of improved care at lower costs. This means an ideal way to approach this configuration may be through existing strategic customers. Also, it will be essential for the collaborating parties to define value upfront, and to demonstrate ongoing commitment towards realizing such value.

3. Going after a mega-play across the value chain



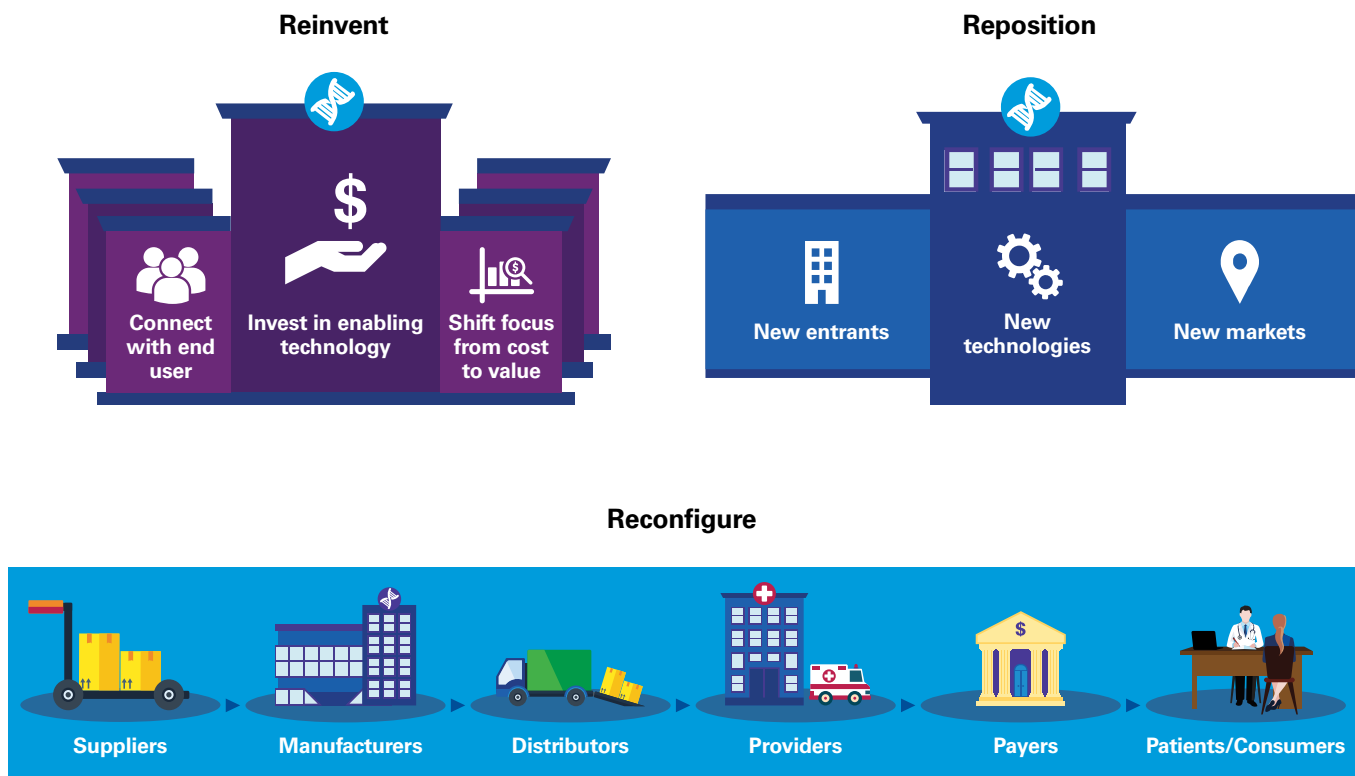
A small number of companies, including those that may not be in the medical device industry today, will leverage their financial weight and transform into 'one-stop-shops' for care. They will reconfigure to fully own the value chain, offering a comprehensive suite of products, services and intelligence. This configuration is likely to be complex (possibly eliminating distributors), and will enhance the overall customer journey through preventive and personalized care both in the hospital and home settings. Manufacturers following this path will build trusted healthcare brands and create customized care solutions powered by the latest technologies, like 3D printing, blockchain, and robotics. These 'mega players' will create new revenue streams and gain market share through integrated offerings that are designed to minimize costs and maximize experience.

This configuration will require heavy capital outlay, and eventually, the ability to provide complete solutions across a wide range of device segments and disease states. Solutions will be broadly defined, requiring companies to adopt a more consultative mindset. The decision to make a mega play will not be grounded in financial projections, but rather deep customer insights and connectivity, and backed up by brand. It is likely to be a high stakes race, requiring careful balance between a diversified portfolio and a de-risked business.

These three configurations are unlikely to be the only ones that will exist in 2030. Global industry executives need to boldly reimagine the device company of the future, considering multiple possibilities – including configurations that extend beyond the boundaries of today's value chain.

Staying ahead in 2030

So what does this all mean for your medical device company?



What can you do to kick-start your journey towards 2030, and realize the 'Reinvent-Reposition-Reconfigure' strategy? In order to create a winning configuration going forward, medical device companies should consider the following recommendations:

Define your new value proposition

Decide the combination of products, services and intelligence which differentiate your company in the minds of customers, patients and consumers. Offerings should be designed following a 'user-back' rather than a 'device-forward' approach. Constantly evaluate and 'upgrade' the global portfolio. Prevention should be considered more important than treatment and cure over the coming decade, with companies

delivering value far beyond the device – increasingly to consumers, in addition to physicians and patients. The value proposition in 2030 will not translate solely into revenues and margins – it will mean protecting and creating market share. And it will involve relationships based on trust, where medical device companies are not just servicing their customers, but advising them along each step of their individual care journey.

Invest smartly

Proactively understand the impact of future technologies on your global business. Be open to new ideas and pilots in order to test concepts, with the corresponding ability to fail fast and scale quickly as needed. By investing in a strong interoperable digital

infrastructure and harnessing data, companies can both expand their business models and position themselves to compete in a transformed environment. A strong decision framework should support build versus buy choices, and a robust technology roadmap should inform the pathway from data to intelligence. Medical device companies should also continuously incorporate learnings from industry peers as well as best practices from other sectors.

Collaborate and establish an ecosystem

Executing on business and operating model choices will likely require capabilities from an expanded external network. While M&A activity intended to build scale and diversify portfolio will continue, the shift to services and intelligence should generate deal activity focused on establishing corresponding capabilities, both within and outside the value chain. Companies will need to institute a systemic process to identify strategic alliance partners and an internal capability to effectively manage their ecosystem. Collaborate widely, including cross-sector, conduct joint experiments and even consider co-competition to meet the goals for your chosen configurations.

Adopt a flexible, modular organizational structure

This doesn't mean that large multi-billion dollar corporates should operate as a start-up, but it requires active steps towards a more agile and nimble organizational structure. In a dynamic environment, medical device companies will need to react quickly to market opportunities and move at 'deal speed' to realize value from growth transactions. Processes should be streamlined and people empowered. While ensuring adequate levels of governance by segment, allow for faster decision making – especially as it relates to the portfolio (products, services and intelligence) and technology.

Don't let your past dictate your future

Challenge the traditional ways of operating your business, and try novel approaches. Develop a deeper understanding of the end user, their emerging needs and create different scenarios of how your business might look like in 2030. By attempting to disrupt themselves, medical device companies can stay a step ahead of emerging competitors and not wait for the 'how to win' playbook to be rewritten. It is entirely possible (and probable) that in the future, a multi-thousand dollar machine will be displaced by a portable device that costs less than US\$100.

Stake your claim in the medical device value chain of 2030 today to avoid the commodity trap.



Sourcing & notes

1. Market size extrapolated from World Preview 2016, Outlook to 2022, EvaluateMedTech, October 2016
<http://info.evaluategroup.com/rs/607-YGS-364/images/mt-wp16.pdf>
2. Ibid.
3. The biggest takeaway from the annual meeting of orthopedic surgeons (AAOS), MedCity News, 21 March 2017
<https://medcitynews.com/2017/03/biggest-takeaway-annual-meeting-orthopedic-surgeons-aaos/>
4. Philips tackles biggest health IT challenges with connected health software, solutions and services at HIMSS 2016, 25 February 2016, accessed through Philips website
<https://www.philips.co.uk/a-w/about/news/archive/standard/news/press/2016/20160225-Philips-tackles-biggest-health-IT-challenges-with-connected-health-software-solutions-and-services-at-HIMSS-2016.html>
5. mHealth and Home Monitoring, Berg Insight, 2017
<http://www.berginsight.com/ReportPDF/ProductSheet/bi-mhealth8-ps.pdf>
6. Remote Patient Monitoring Devices Market expected to reach USD 1.9 billion by 2025, PR Newswire, 22 May 2017
<https://www.prnewswire.com/news-releases/remote-patient-monitoring-devices-market-expected-to-reach-usd-19-billion-by-2025-300461991.html>
7. New Kardia™ Band for Apple Watch Delivers Medical-grade Electrocardiogram (EKG) Anytime, Anywhere, 16 March 2016, accessed through AliveCore website
https://www.alivecor.com/press/press_release/new-kardia/
8. OncoAssist becomes latest app to be classified as a medical device, PM LiVE, 19 February 2013
http://www.pmlive.com/blogs/digital_intelligence/archive/2013/february/oncoassist_becomes_latest_app_to_be_classified_as_a_medical_device_464268
9. Postmarket management of cybersecurity in medical devices, US Food and Drug Administration, 28 December 2016
<https://www.fda.gov/downloads/medicaldevices/deviceregulationandguidance/guidancedocuments/ucm482022.pdf>
10. Fresenius website, accessed on 15 November 2017
<https://www.fresenius.com/>
11. Fresenius Medical banks on home dialysis with \$2 billion NxStage acquisition, Reuters, 7 August 2017
<https://uk.reuters.com/article/us-nxstage-medical-m-a-fresenius-care/fresenius-medical-banks-on-home-dialysis-with-2-billion-nxstage-acquisition-idUKKBN1AN0GL>
12. Siemens unit to be Germany's largest IPO since 1996, FinancialTimes, 29 November 2017
<https://www.ft.com/content/57ffd408-d521-11e7-a303-9060cb1e5f44>
13. Siemens Healthineers signs strategic partnership for laboratory services, 2 February 2017
<https://www.siemens.com/press/en/pressrelease/?press=/en/pressrelease/2017/healthineers/pr2017020153hcn.htm&content%5b%5d=HC>
14. Siemens Healthineers, IBM Watson Health Forge Alliance On Population Health, Med Device Online, 12 October 2016
<https://www.meddeviceonline.com/doc/siemens-healthineers-ibm-watson-health-forge-alliance-on-population-health-0001>

15. Medtronic and Fitbit Partner to Integrate Health and Activity Data Into New CGM Solution for Simplified Type 2 Diabetes Management, Medtronic press release, 7 December 2016
<http://newsroom.medtronic.com/phoenix.zhtml?c=251324&p=irol-newsArticle&ID=2228203>
16. Medtronic Syncs Garmin® Activity Tracker Data Directly into Remote Patient Monitoring Mobile Platform, Medtronic press release, 13 April 2017
<http://newsroom.medtronic.com/phoenix.zhtml?c=251324&p=irol-newsArticle&ID=2261897>
17. Medtronic Announces Diabetes Partnerships With IBM Watson, Nutrino, Glooko, Med Device Online, 14 June 2016
<https://www.meddeviceonline.com/doc/medtronic-announce-diabetes-partnerships-with-ibm-watson-nutrino-glooko-0001>
18. Medtronic Announces Formation of Hospital Solutions Business Aimed at Driving Efficiencies and Cost Savings, Medtronic Press Release, 2 September 2013
<http://newsroom.medtronic.com/phoenix.zhtml?c=251324&p=irol-newsArticle&id=1851106>
19. New Partnership Between Medtronic and Atlas General Hospital Brings Advanced Surgical Technologies and Treatment Options to Serbia, Medtronic Press Release, 15 March 2017
<http://newsroom.medtronic.com/phoenix.zhtml?c=251324&p=irol-newsArticle&ID=2254156>
20. University Hospitals, Medtronic partner to improve care delivery, Crain's Cleveland Business, 29 November 2016
<http://www.crainscleveland.com/article/20161129/NEWS/161129821/university-hospitals-medtronic-partner-to-improve-care-delivery>
21. Five Approaches When You Need Costovation, Not Innovation, CMO Network, 10 December 2013
<https://www.forbes.com/sites/stephenwunker/2013/12/10/377/#7c6144257440>
22. Bringing cost-reducing innovations to healthcare delivery, Medtronic website, January 2014
<http://www.endovascularmagazine.eu/articles/2014-01/Bringing-cost-reducing-innovations-to-healthcare-delivery/index.htm>
23. Alibaba's healthcare unit invests \$35M in a medical imaging company, Tech Crunch, 30 March 2016
<https://techcrunch.com/2016/03/30/alibaba-health-wanliyun/>
24. J&J and Google's Verb Surgical looks to define, lift robotic surgery, Mass Device, 20 October 2016
<http://www.massdevice.com/jj-googles-verb-surgical-looks-define-lift-robotic-surgery>
25. CVS agrees to buy Aetna in \$69 billion deal that could shake up health-care industry, The Washington Post, 3 December 2017
https://www.washingtonpost.com/news/wonk/wp/2017/12/03/cvs-agrees-to-buy-aetna-in-69-billion-deal-that-could-shake-up-health-care-industry/?utm_term=.df9a870800f0
26. The Blockchain for Healthcare: Gem Launches Gem Health Network With Philips Blockchain Lab, Bitcoin Magazine, 26 April 2016
<https://bitcoinmagazine.com/articles/the-blockchain-for-healthcare-gem-launches-gem-health-network-with-philips-blockchain-lab-1461674938/>
27. Stryker launches Mako robotic platform total-knee application, Mass Device, 14 March 2017
<http://www.massdevice.com/stryker-launches-mako-robotic-platform-total-knee-application>
28. Google Can Help Detect Breast Cancer Using Artificial Intelligence, MIT Technology Review Pakistan, 6 March 2017
<http://www.technologyreview.pk/google-can-help-detect-breast-cancer-using-artificial-intelligence>
29. Qualcomm expands collaboration with Novartis for connected COPD therapy, Qualcomm Press Release, 5 January 2016
<https://www.qualcomm.com/news/releases/2016/01/05/qualcomm-expands-collaboration-novartis-connected-copd-therapy>
30. No More Dialysis, Scientists Have Developed A Bionic Kidney, Medical-Online, 3 April 2017
<http://www.medicalonline1.com/2017/04/03/no-more-dialysis-scientists-have-developed-a-bionic-kidney>
31. USA - Overview of medical device industry and healthcare statistics, Emergo website, accessed on 15 November 2017
<https://www.emergogroup.com/resources/market-united-states>
32. China - Medical Devices, China Country Commercial Guide, US export.gov website, accessed on 15 November 2017
<https://www.export.gov/article?id=China-Medical-Devices>
33. India can be among world's top 5 medical devices markets, Business Standard, 15 February 2017
http://www.business-standard.com/content/b2b-pharma/india-can-be-among-world-s-top-5-medical-devices-markets-himanshu-baid-117021500535_1.html

34. China - Medical Devices, China Country Commercial Guide, US export.gov website, accessed on 15 November 2017
<https://www.export.gov/article?id=China-Medical-Devices>
35. Medical Devices Manufacturing in India: A Sunrise Segment, Khaleej Times, 30 January 2017
<https://www.ibef.org/arab-health-2017/download/EEPC-IBEF-Arab-Health-Supplement-30-Jan-201.pdf>
36. USA - Overview of medical device industry and healthcare statistics, Emergo website, accessed on 15 November 2017
<https://www.emergogroup.com/resources/market-united-states>
37. China - Medical Devices, China Country Commercial Guide, US export.gov website, accessed on 15 November 2017
<https://www.export.gov/article?id=China-Medical-Devices>
38. France - Medical Equipment, France Country Commercial Guide, US export.gov website, accessed on 15 November 2017
<https://www.export.gov/article?id=France-Medical-Equipment>
39. Germany - Medical Equipment, Germany Country Commercial Guide, US export.gov website, accessed on 15 November 2017
<https://www.export.gov/article?id=Germany-Medical-Technologies>
40. Medical Devices Manufacturing in India: A Sunrise Segment, Khaleej Times, 30 January 2017
<https://www.ibef.org/arab-health-2017/download/EEPC-IBEF-Arab-Health-Supplement-30-Jan-201.pdf>
41. Japan Medical Market, Pacific Bridge Medical, accessed on 15 November 2017
<http://www.pacificbridgemedical.com/target-asian-markets/japan-medical-market/>
42. United Kingdom - Medical Equipment, United Kingdom Country Commercial Guide, US export.gov website, accessed on 15 November 2017
<https://www.export.gov/article?id=United-Kingdom-Medical-Equipment>
43. 2016 China's medical device business revenue, net profit, market value list released, Medical Online, 4 May 2017
<http://medical.ofweek.com/2017-05/ART-12004-11102-30130675.html>
44. The Chinese Medical Sector, Switzerland Global Enterprise, 30 April 2017
https://www.s-ge.com/sites/default/files/cserver/article/downloads/medtech_report_china_2017.pdf
45. Alibaba's healthcare unit invests \$35M in a medical imaging company, Tech Crunch, 30 March 2016
<https://techcrunch.com/2016/03/30/alibaba-health-wanliyun/>
46. Baidu launches medical chatbot to help Chinese doctors diagnose patients, The Verge, 11 October 2016
<https://www.theverge.com/2016/10/11/13240434/baidu-medical-chatbot-china-melody>
47. Dalian Wanda to invest \$10 billion in China healthcare hub, Reuters, 10 April 2017
<http://www.reuters.com/article/us-dalian-wanda-healthcare/dalian-wanda-to-invest-10-billion-in-china-healthcare-hub-idUSKBN17C0YI>

Authors

Anuj Kapadia

Director

Global Strategy Group

KPMG in the US

E: anujkapadia@kpmg.com

T: +1 212 872 3040

Roger van den Heuvel

Principal

Head of Life Sciences

Global Strategy Group

KPMG in the US

E: revandenheuvel@kpmg.com

T: +31 206 567044

Chris Stirling

Partner

Global Chair, Life Sciences

KPMG in the UK

E: christopher.stirling@kpmg.co.uk

T: +44 207 311 8512

Jia Zhou

Director

Global Strategy Group

KPMG in China

E: jia.zhou@kpmg.com

T: +852 3927 3060



About KPMG's Global Strategy Group

KPMG's Global Strategy Group works with private, public and not-for-profit organizations to develop and implement strategy from 'Innovation to Results' helping clients achieve their goals and objectives. KPMG Global Strategy professionals develop insights and ideas to address organizational challenges such as growth, operating strategy, cost, deals and transformation.

kpmg.com/strategy



The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

© 2018 KPMG International Cooperative ("KPMG International"), a Swiss entity. Member firms of the KPMG network of independent firms are affiliated with KPMG International. KPMG International provides no client services. No member firm has any authority to obligate or bind KPMG International or any other member firm vis-à-vis third parties, nor does KPMG International have any such authority to obligate or bind any member firm. All rights reserved.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

Designed by Evalueserve.

Publication name: Medical devices 2030

Publication number: 135111-G

Publication date: January 2018