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Digital readiness in medtech

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How a diverse business is adapting to Industry 4.0

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Executive summary

The innovations in digital technology and smart connections that have led to what is commonly known as Industry 4.0 — or the fourth industrial revolution — hold tremendous potential for the medical technology (medtech) industry. Digitization can help medtech companies improve their operational and financial performance through both internal and customer-facing applications. Yet most companies in the industry are still in the early stages of incorporating these digital technologies into their core business operations. In the third quarter of 2016, we analyzed a sample of 20 medtech companies to gauge their Industry 4.0 maturity and digital readiness across three dimensions: (1) digitization of products and services; (2) business model (digitization of market and customer access); and (3) operating model (digitization of value chains and processes).

The results give a snapshot of digitization in medtech thus far, and highlight priority areas that companies need to focus on.

Key findings for specific segments include the following:

- Companies that sell **medical aids** have reached a mature stage in their use of digitization for pricing as well as for customer and patient access. However, they can build on that progress by using data to gain a deeper knowledge of their customers' needs.

- **Diagnostics** companies are showing a strong use of digital technologies in product and service portfolios. Yet they need to shift away from expensive sales channels and into data-driven digital models that will help them reduce commercial costs, generate better customer insights, and build stronger customer relationships with price-sensitive providers.

- **Surgical products** companies are reasonably mature in their use of digital products and sales channels. But they can apply new tools and solutions to manufacturing processes, enabling greater customization and smaller lot sizes.

- Medtech companies that are **regional in scope** and want to expand their geographic reach must use digital technologies to help improve their pricing strategies and manage complexity.

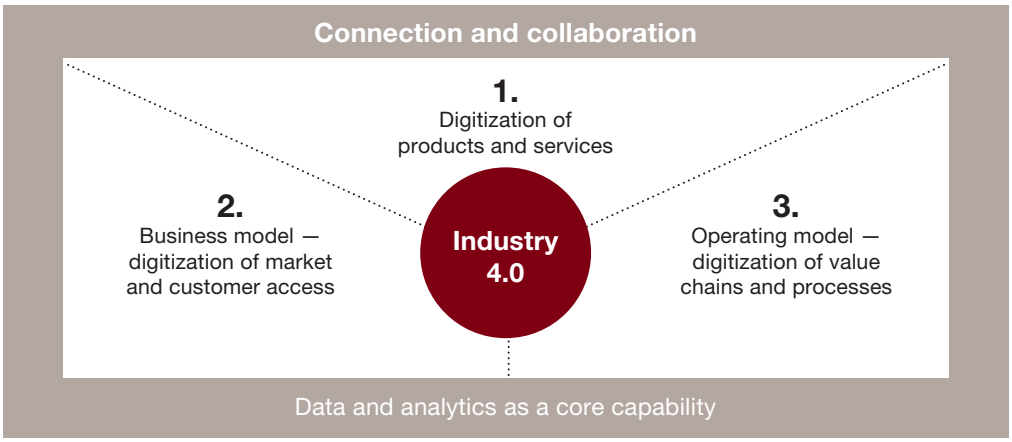
- Medtech companies that are trying to **diversify their customer base** will also need stronger digital capabilities. In particular, digitization will help them develop the market access, value chains, and processes they need to reach new markets.

Because digital technology advances very quickly, medtech companies need to begin investing in digital capabilities now. Those that do will be able to differentiate themselves and gain a first-mover edge over the competition.

The power of digitization

Across all industry sectors, the fourth industrial revolution — also known as Industry 4.0 — is transforming all steps of the value chain, including procurement, internal operations, and customer interactions. (See "Industry 4.0: How digitization makes the supply chain more efficient, agile, and customer-focused.") Industry 4.0 includes digital components such as embedded sensors, mobile platforms, and machine-to-machine communication. Collectively, such components allow companies to integrate their vertical and horizontal value chains, thereby achieving a dramatic increase in operational efficiency and overall performance. On the customer-facing end of the value chain, new technologies enable innovative new product and service offerings, along with digital business models that improve customer access. Underlying all of these applications are data and analytics, which provide companies with detailed information about all aspects of their business (*see Exhibit 1*).

Exhibit 1
Key dimensions of Industry 4.0



Source: Strategy&

A diverse and innovative industry

Medical technology (medtech) is an interdisciplinary business that sits at the nexus of several adjacent industries that are innovative themselves — including pharma, electronics, engineering, and telecommunications and data services. All of these industries are undergoing dramatic changes at the hands of emerging digital technologies, tools, and solutions. Because the major companies in these industries operate on the cutting edge of digital technology, they are spurring further innovation in the medtech sector (*see Exhibit 2, next page*).

The medtech industry is extremely diverse, ranging from commodity-type supplies such as bandages to sophisticated high-tech diagnostic tools such as imaging devices. The industry can be broken into three segments: diagnostic products, including imaging devices, endoscopes, and other technologies, with a market size of more than US$100 billion worldwide; surgical products, including power tools and equipment for operating rooms, cardiological and ophthalmological devices, and orthopedics products, among others, with a market size of more than $140 billion worldwide; and medical aids, including consumables, hearing aids, glasses, dental devices, and other products, which have a market size of more than $150 billion worldwide. (Figures are based on Strategy& analysis and market research reports.) The overall medtech market is expanding continuously, with an expected compound annual growth rate of about 5 percent through 2020, at which point it will be worth more than $500 billion worldwide.

A common element among all medtech products, however, is that they entail a tremendous amount of innovation.

A number of trends are threatening long-established business models, spurring innovation among medtech players to face these threats. The trends include pricing pressure from payors, increased clout among institutional buyers rather than individual clinicians, and a demand for scientific medical evidence demonstrating the value that products generate. Rather than simply selling products, medtech companies are increasingly tasked with selling end-to-end solutions that can deliver better care at lower prices. Digital technology is a primary enabler for achieving this goal.

Exhibit 2
Medtech's adjacent industries

Pharma

Pharma and medtech have mutual stakeholders including regulators and payors

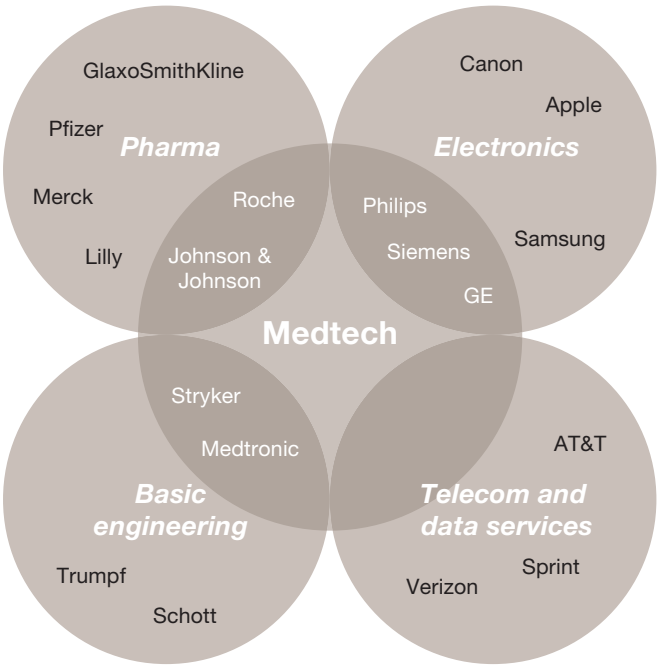
Trend in pharma is to offer diagnostics/drug bundles instead of drugs only

Many pharma companies pursue growth opportunities in medtech

Basic engineering

Expertise in molding, coating, and other basic engineering procedures is needed for the production of medical devices

Medtech and engineering work together to develop materials and manufacturing technologies



Electronics

Medtech devices use high technology and electronics

Electronics companies offer healthcare-related devices, such as imaging devices, pedometers, pulse meters, and blood pressure monitors

Telecom and data services

New remote healthcare solutions require substantive data handling and storage capabilities

The examples here do not represent a complete list of companies with a medtech presence. Companies in overlapping circles have particularly strong overlap with medtech industry.

Source: Strategy& analysis

The medical technology industry is particularly ripe for the benefits of Industry 4.0. Many medtech companies already have highly advanced products and services that capitalize on the potential of digital technology. Yet they are still in the early stages of digitizing their business models and customer access — along with integrating their vertical and horizontal value chains.

In the third quarter of 2016, we analyzed the digital maturity of a representative sample of 20 medtech companies, seeking a cross-section of well-known players in each of the three segments. The companies we analyzed, like the majority of industry players, are based in Europe or North America, but we sought a balance between those that serve regional markets and those that serve global markets. For all, we measured their Industry 4.0 maturity and digital readiness across three dimensions:

1. Digitization of products and services

2. Business model — digitization of market and customer access

3. Operating model — digitization of value chains and processes

We looked at a detailed set of criteria for each of the three dimensions (*see Methodology, next page*). Our goal was to offer a snapshot of digitization in the medtech industry thus far and identify priority areas as well as opportunities for companies to target.

Methodology

Our maturity model analysis looked at each company's digitization of products and services; business model (digitization of market and customer access); and operating model (digitization of value chains and processes).

We ranked the companies in each of these dimensions across a range of five maturity levels: analog player; digital novice; vertical integrator; horizontal collaborator; and digital champion. Notably, a company can be highly mature in one dimension and relatively immature in another (*see Exhibit A, next page*).

We scored the companies based on our direct experience with their business and publicly available information, establishing a maturity ranking of 1 to 5 for each dimension, with a value below 1 indicating a company still in the analog stage and a value between 4 and 5 indicating a digital champion, or full participant in Industry 4.0.

The sample includes 20 medtech companies that we analyzed across different parameters. We distinguished companies by the medtech segment they serve: diagnostics, surgical products, and medical aids (the latter including consumables, hearing aids, glasses, and similar products). We also ensured that the sample included companies serving different customer types (expert clinicians, institutions, and multichannel customers); product categories (capital goods, durables, and consumables); ownership structures (publicly traded, privately held, corporate-owned, and private equity–owned); and geographic span of markets served (regional/local versus global). (*See Exhibit B, next page.*)

Maturity criteria for each dimension

- **Digitization of products and services**
  - Value from digital features, products, and services
  - Digitization of average product
  - Potential for individualized products
  - Digitization across project life cycles
  - Use of digital in the company's business model
  - Collaboration with partners, suppliers, and clients
- **Business model — digitization of market and customer access**
  - Flexibility of pricing system
  - Integration of sales channels
  - Digital enablement among the sales force
  - Collaboration with partners regarding customer access
  - Use of data to generate customer insights
- **Operating model — digitization of value chains and processes**
  - Digitization of vertical value chain
  - Real-time view of production
  - End-to-end IT-enabled planning and steering process
  - Digitization of production equipment
  - Digitization of horizontal value chain

Exhibit A
Five digital maturity levels

Stage I *Analog player*	Stage II *Digital novice*	Stage III *Vertical integrator*	Stage IV *Horizontal collaborator*	Stage V *Digital champion*
	Product and service portfolio			
No use of digital technologies	First digital solutions and isolated applications	Digital product and service portfolio with software, network (M2M), and data as key differentiator	Integrated customer solutions across supply chain boundaries; collaboration with external partners	Development of disruptive new value proposition with innovative product and service portfolio; lot size of one
	Market and customer access			
	Online presence separated from offline channels; product focus instead of customer focus	Multichannel distribution with integrated use of online and offline channels; data analytics deployed (e.g., for personalization)	Individualized customer approach and interaction, together with value chain partners	Integrated customer journey management across all digital marketing and sales channels with customer empathy and CRM
	Value chains and processes			
	Digitized and automated subprocesses	Vertical digitization and integration of process and data flows within the company	Horizontal integration of processes and data flows with customers and external partners; intensive data use	Fully integrated partner ecosystem with self-optimized, virtualized processes and decentralized autonomy

Source: Strategy& analysis

Exhibit B
Survey parameters

Medtech cluster	Customer type	Product category	Ownership structure	Geographic span
Diagnostics	Expert clinicians	Capital goods	Publicly traded	Regional/local
Medical aids	Institutions	Durables	Privately held	Global
Surgical products	Multichannel customers	Consumables	Corporate-owned	
			Private equity–owned	

Source: Strategy& analysis

Key findings

We analyzed the data for our sample of 20 companies across multiple parameters, but the most relevant findings can be broken out by dimension (*see Exhibit 3, next page*).

Dimension 1: Digitization of products and services

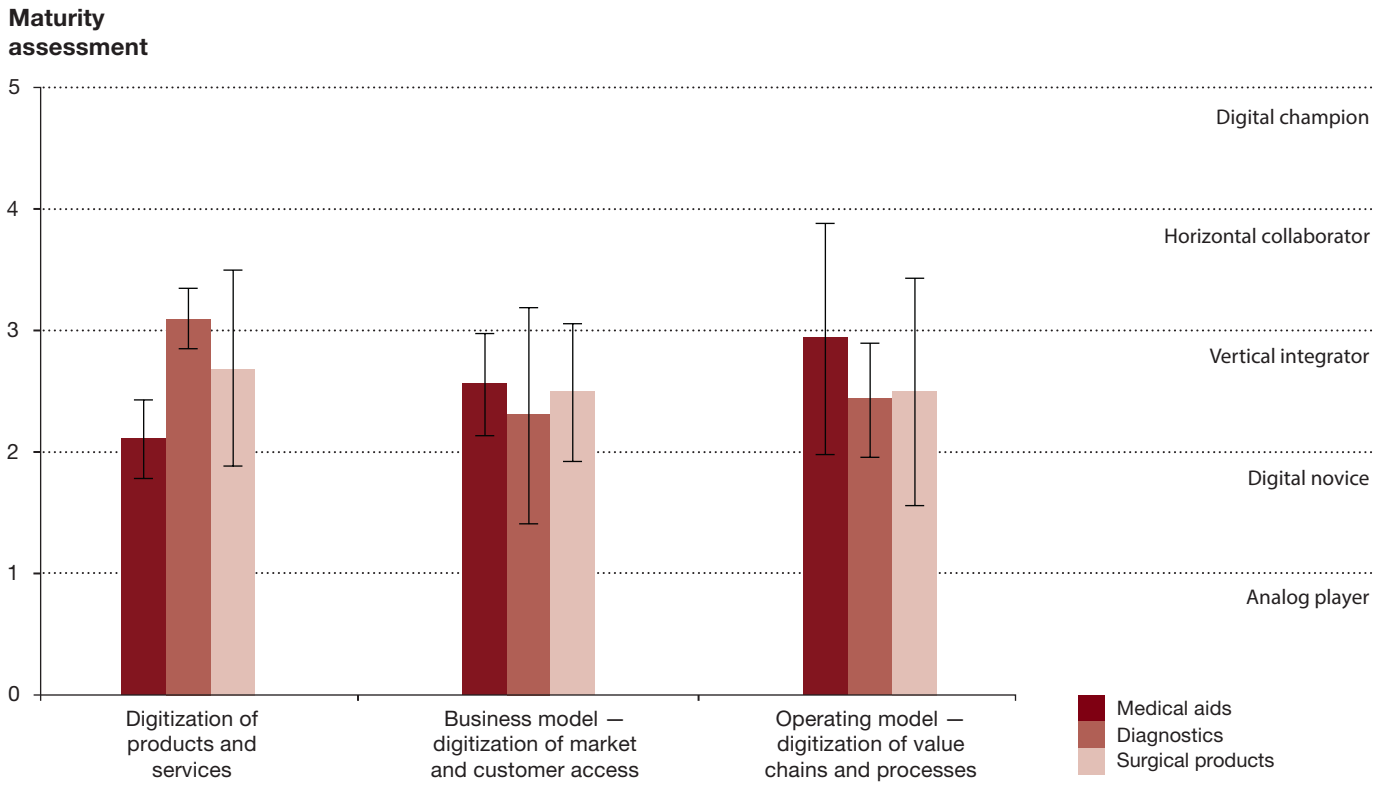
Diagnostics companies are the most advanced segment in their application of digital technology to products and services, followed by firms that sell surgical supplies. By contrast, medical aids manufacturers lag behind. This finding is rooted in the nature of the diagnostics segment, which develops highly sophisticated machines that incorporate cutting-edge technology, such as computer tomography (CT) or magnetic resonance tomography (MRT) scanners. Diagnostic products are digitally controlled and connected, use complex computing power and algorithms, and are often software-configurable. Successful manufacturers of such products have highly mature digital design and manufacturing capabilities, built around advanced engineering and automated production.

The current focus of diagnostics companies goes beyond digitization of products; these companies are pursuing more innovative digital business models that simplify the purchasing process for buyers — and, even more important, the finance process. That is a necessity, given the high capital investment required for their products, and the backlog of capital investments among many hospitals and health systems. For example, some diagnostics companies now offer pay-per-use models rather than requiring an outright purchase. Companies have also successfully developed digitally enabled new revenue streams, such as software updates or streamlined sales of additional features. That creates a better customer experience, and it generates usage data that diagnostics companies can sift through for insights to refine their product and service offerings over time.

By contrast, the surgical products segment still has room to grow in its application of digital to its product portfolios and business models, and

Exhibit 3

Digital maturity: Breakdown by medtech cluster across three dimensions



Note: The scale represents the digital maturity of the assessed companies, with 1 equal to analog player and 4 to 5 equal to digital champion. The vertical bars on each medtech cluster indicate the standard deviation of the assessment rating of the respective medtech companies.

Source: Strategy& analysis

the medical aids segment is even further behind when it comes to product digitization (*see Exhibit 4, next page*). Yet there is a real opportunity for companies to differentiate themselves and create a first-mover advantage. For example, among medical aids, a digitally enhanced bandage could be designed to administer a dose of medication, measure its effect on a patient, and adjust the dosage in response. A medication container could be built with a sensor that detects when it is empty and automatically orders a refill.

Dimension 2: Business model — digitization of market and customer access

For the second dimension we analyzed, market and customer access, companies in the medical aids and surgical supply segments were slightly ahead of diagnostics firms. That is not surprising considering the way the sales forces for diagnostic equipment operate; the equipment is still sold largely through traditional channels in which a highly experienced sales rep visits hospitals and outpatient practices, and builds an intensely personal relationship with customers. The customer relationship doesn't stop after the purchase is complete; instead, it requires follow-on service, upgrades, and other elements that are often addressed through in-person interactions. This process is highly relationship-driven and has not changed much in the past decade or more. It's expensive and relatively inefficient, yet the margins and product value in the diagnostics segment are high enough to sustain it — although that is beginning to change.

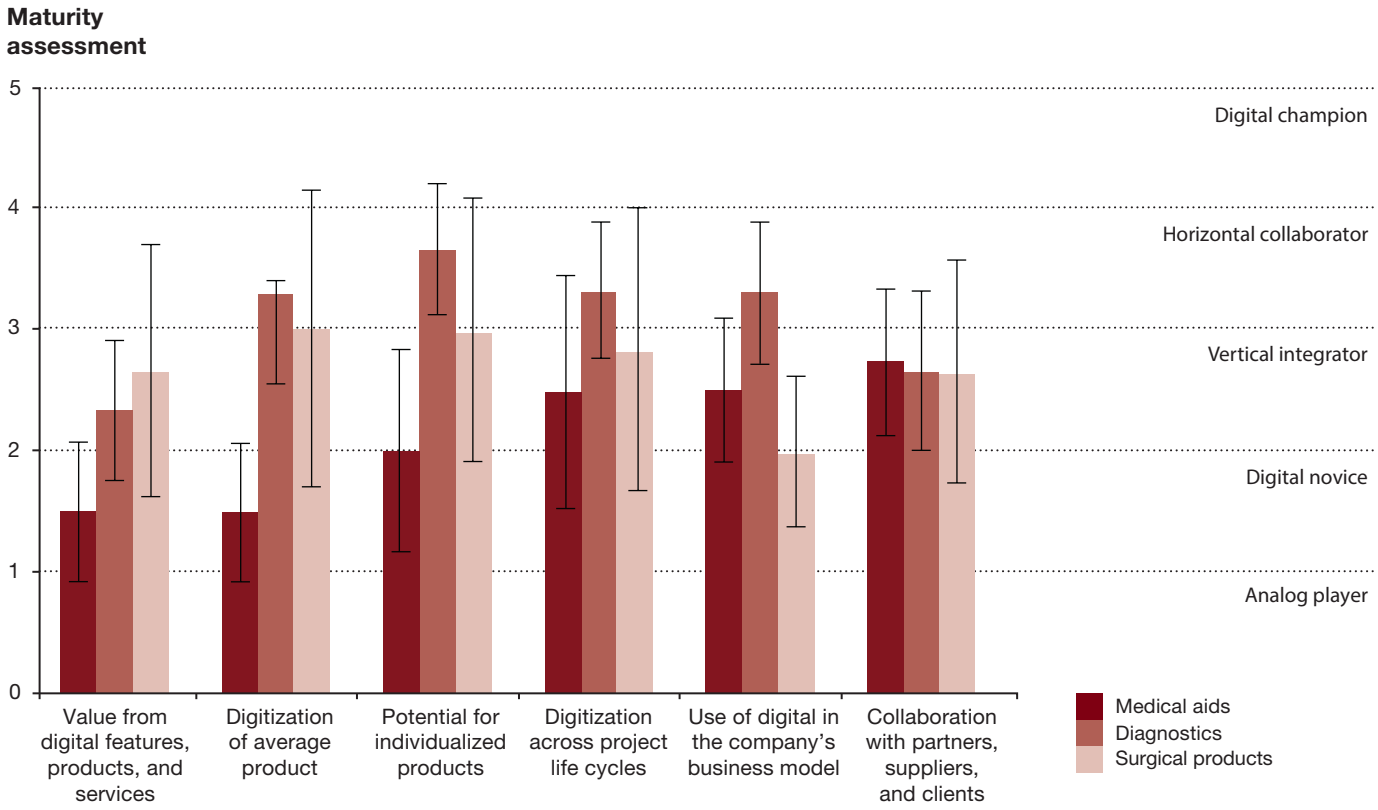
There is a real opportunity for companies to differentiate themselves and create a first-mover advantage.

We observed a similar effect when we analyzed the companies according to their product categories — capital goods versus consumables versus durables (*see Exhibit 5, page 16*). Our findings indicate that companies selling capital goods and durables have something to learn from companies selling consumables, which sell lower-priced goods in higher volume and have already taken steps to exploit digital technologies. Digitally enhanced sales channels allow companies to significantly extend their market reach at a lower cost-to-serve rate. Highly enabled sales reps can use data analytics and mobile customer relationship management (CRM) platforms to analyze customer interactions and segment customers at an extremely granular level, tailoring marketing and sales messages to the individual preferences of specific sales channels, purchasing authorities, or even individual clinicians. Reps can also use digital solutions to dynamically price products and services across the portfolio in real time.

Medical aids companies in particular are more mature in how they use digital technologies to meet the varying requirements of different sales channels. For example, medical aids are sold to outpatient practitioners,

Exhibit 4
Digitization of products and services

Results by medtech cluster



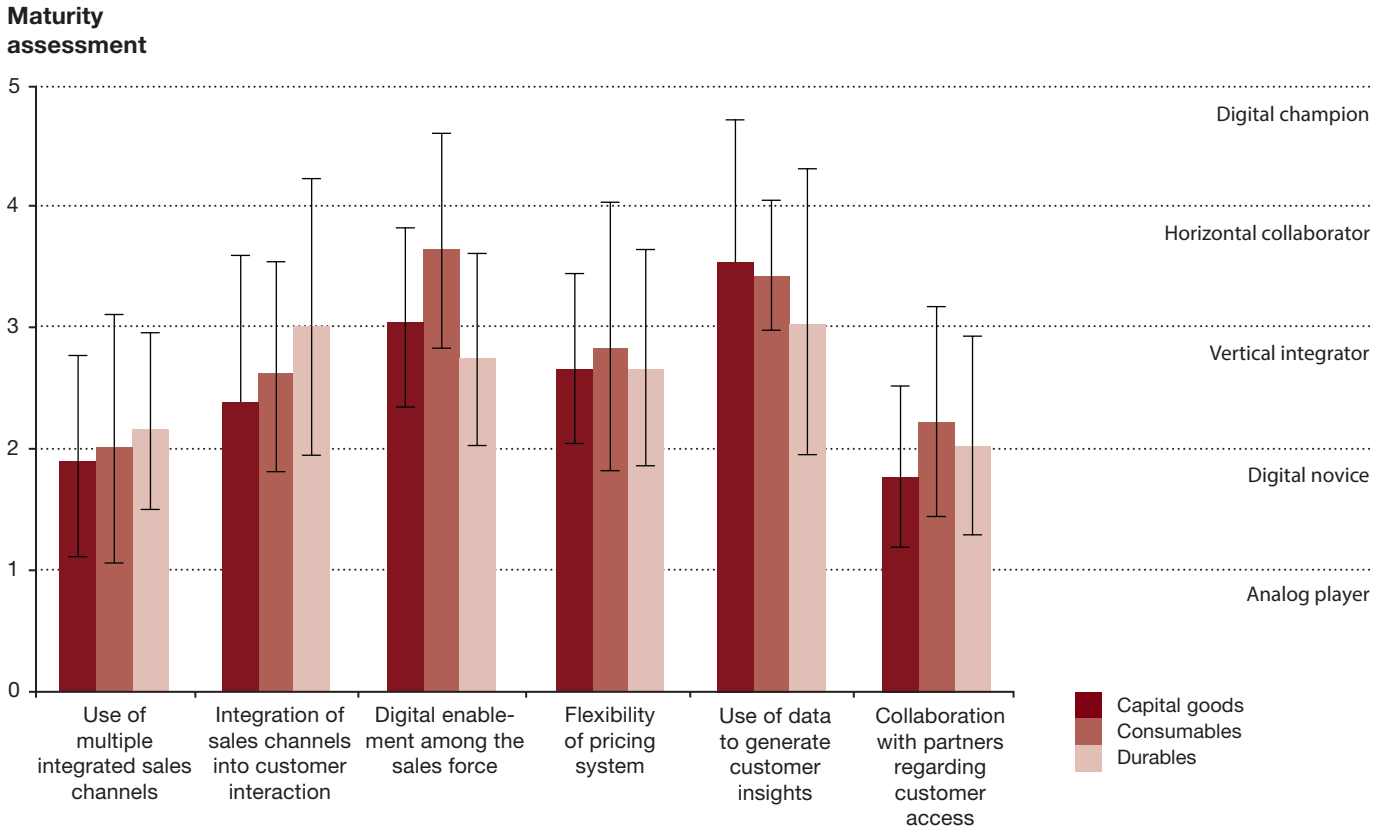
Note: The vertical bars on each detail indicate the standard deviation of the assessment rating of the respective medtech companies.

Source: Strategy& analysis

Exhibit 5

Business model — digitization of market and customer access

Results by product category



Note: The vertical bars on each detail indicate the standard deviation of the assessment rating of the respective medtech companies.

Source: Strategy& analysis

hospitals, and pharmacies, all with specific requirements regarding order quantities, delivery time and logistics, additional services, and other factors. Meeting these needs — while keeping operational complexity in check — requires advanced digital solutions and the capabilities to exploit them.

Dimension 3: Operating model — digitization of value chains and processes

Third, we looked at how effectively companies apply Industry 4.0 solutions and digital enablers to integrate their horizontal and vertical value chains and improve operational processes. Using the Internet of Things, digital monitoring, and advanced production equipment can increase productivity and quality, enable new business and operating models, and boost operational efficiency, among other advantages.

What our analysis shows is that companies that sell to multiple types of customers — i.e., multichannel customers including hospitals, outpatient practitioners, pharmacies, wholesalers, or institutional clients such as group purchasing organizations — are more mature in the digitization of their value chains and processes. Their manufacturing facilities need to be more agile and flexible to respond to the varying service requirements of different customer profiles and rapid shifts in supply and demand. Mass customization is a key factor in this shift: 3D printing is already in widespread use for creating hearing aid parts and dental prosthetics that are customized to the individual, and in the last several years, surgeons have begun to perform knee and hip replacements using 3D-printed joints.

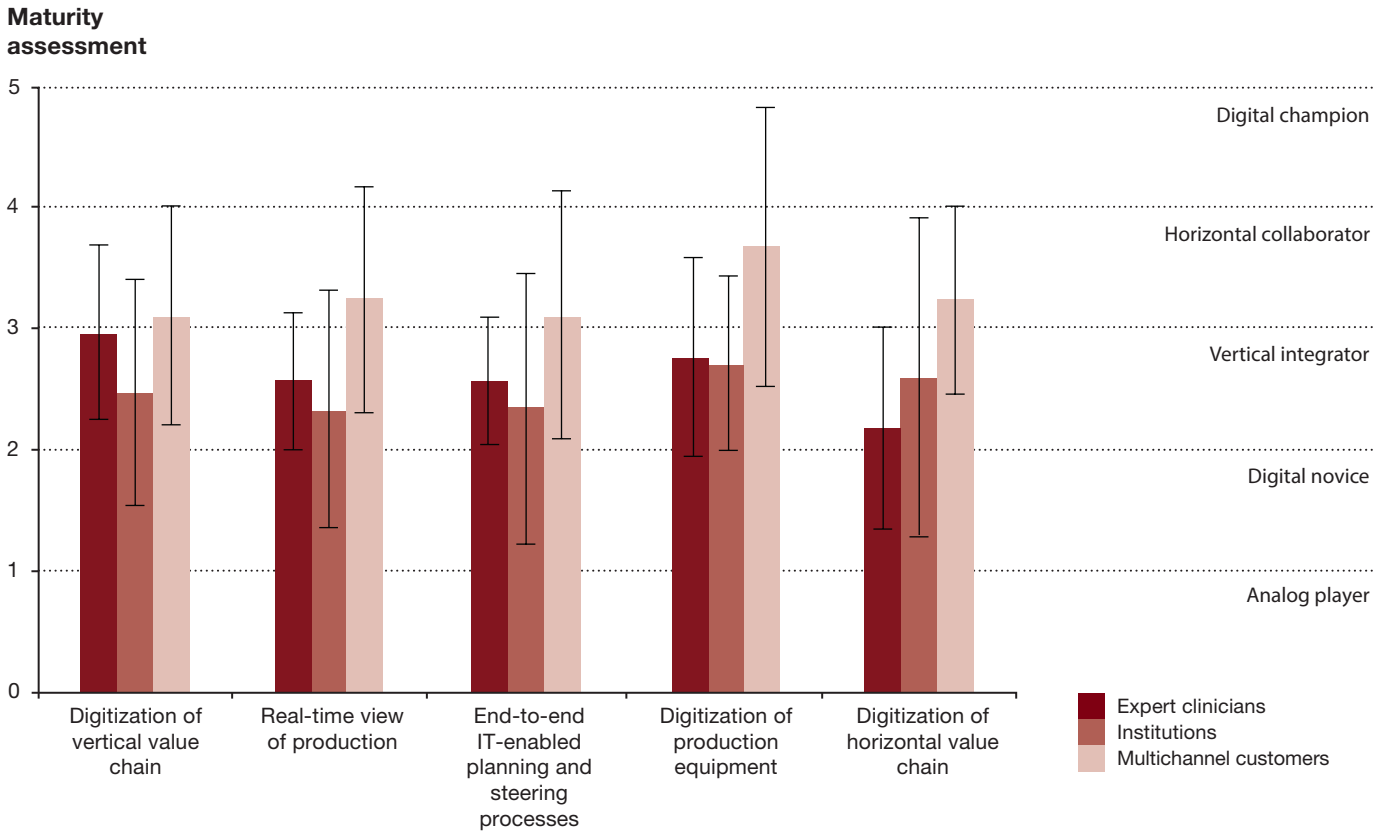
Companies that sell to multiple types of customers are more mature in the digitization of their value chains and processes.

Sales forecasting and production planning also rely on strong digital capabilities. Here again, companies serving multichannel customers (and not only the expert clinician channel or the institutions channel) are generally the most mature of the three groups we looked at in applying end-to-end IT-enabled planning and steering processes (*see Exhibit 6, next page*). A close look shows that of all companies serving multichannel customers, those focusing on medical aids products have a maturity level close to digital champions. These companies have a large and highly diverse portfolio of products, all sold at high volume and low margin. Digitization allows them to apply data analytics through the entire production process, from accurate demand forecasts through production to warehouse planning and logistics. As a result, they become far more efficient at each stage of the value chain and can respond more effectively to changing service requirements, demand patterns and spikes, and other factors that affect product volume.

Exhibit 6

Operating model — digitization of value chains and processes

Results by customer type



Note: The vertical bars on each detail indicate the standard deviation of the assessment rating of the respective medtech companies.

Source: Strategy& analysis

Strategic implications

Based on our analysis, there are several clear implications for medtech companies. First, our findings show that the overall industry remains at an early stage of digital maturity, with no clear digital champion yet across the dimensions. For example, no player has developed a digital ecosystem comprising multiple players and steps across the value chain. This is a clear opportunity for medtech organizations willing to make bold bets to gain a first-mover advantage.

Moreover, the absence of such an ecosystem increases the risk that a new entrant from another industry — such as technology — could move into the medtech space in a disruptive way, similar to the way Apple's iTunes upended the music industry and Amazon disrupted publishing. Already, healthcare is becoming more consumer-oriented in some markets, with patients increasingly interacting with providers through technology that is developed, owned, and operated by companies outside medtech, such as mobile platforms.

As direct access to patients and their data becomes more valuable — and control over that relationship and data puts some companies in the position of gatekeeper — medtech companies will need to embrace digital patient management and data analytics more aggressively to keep up. These are capabilities that some traditional customers of medtech companies — such as retailers — are beginning to master. At the same time, retailers are also playing a greater role in the delivery of care. Walmart, for example, has taken a role in the healthcare value chain with its walk-in clinics, and is now beginning to offer its own private-label versions of low-tech medical products and services, such as walkers, medical alert devices, and blood pressure monitors. These retail companies are turning from medtech company customers into medtech company competitors.

Digital imperatives for medtech clusters

- **Companies that sell medical aids** are fairly mature regarding their use of digital in pricing and customer access. However, they

can make continued progress by looking at other industries. For example, fast-moving consumer goods (FMCG) players are extremely proficient in how they apply digital to understand the needs of different customers — retailers, wholesalers, distributors, and individual consumers — gathering highly detailed data on marketing initiatives and sales transactions, and using that data to generate insights and systematically improve financial and operational performance. FMCG companies have made sizable investments in data and analytics, generating an attractive return on investment and building strong relationships with their customers. In addition, medical aids companies should invest to build digital components into their product offerings, where there is an opportunity to gain a first-mover advantage.

- **Diagnostics companies** are strong in their use of digital in the product portfolio and in advanced business models. However, their sales channels remain expensive — something their high margins have enabled thus far. Over the longer term, this will likely not be sustainable. Diagnostics companies will need to shift away from selling primarily through sales reps and develop more digital sales channels. Not only will this be more cost-efficient for diagnostics manufacturers, but as buyers become more sophisticated and complex — and more price-sensitive and more attuned to value-based care — they will increasingly seek to purchase products through digital channels. Data-driven models will lead to better customer insights and a stronger customer relationship.

- **Surgical products companies** have a digital maturity somewhere between those of medical aids companies and diagnostics companies. They are reasonably mature in their use of digital products and sales channels. The biggest opportunity for these companies is to apply new tools and solutions to manufacturing processes, enabling greater customization and smaller lot sizes. Additionally, surgical products manufacturers should focus on adding value through improved logistics services and integration of the horizontal value chain. For example, they could offer vendor-managed inventory to streamline the process of ordering products, taking the burden off hospitals and leading to greater transparency. Once a surgeon scans a product's barcode or quick response code in the operating room, an order would automatically go to the manufacturer to ensure consistent inventory levels. As surgical products companies develop their digital capabilities, they might consider getting into new lines of business such as surgical robots or robot-assisted surgery — areas that require a high level of digital maturity.

Digital imperatives for geographic expansion

Some medtech companies are regional players that want to globalize. These companies should focus on using digital to improve pricing where their capabilities lag behind those of globalized competitors with a more diverse base of customers across different regions. Each market has different sales configurations (such as direct sales versus wholesalers and distributors). Those have a corresponding impact on the margin structure for each sales channel. Pricing also depends largely on national reimbursement levels and the degree of competition in a given market. New pricing strategies depend more on a customer's willingness to pay than on traditional cost-plus structures. And individual markets have their own dynamic demand patterns that affect pricing.

All of these differences across markets create significant complexity for global players. Accordingly, regional players should invest in digital pricing management tools and concepts to improve pricing and manage complexity as they expand into new geographic markets.

Digital imperatives for diversifying the customer base

Medtech companies that are trying to diversify their customer base also need to build up digital capabilities. Although they will need to add digital capabilities to their business model, digitization is especially important when it comes to the dimensions of market and customer access, value chain, and processes. Our findings show that companies already serving multiple customer types are roughly a full maturity level ahead of companies targeting a single type of customer.

Conclusion

Historically, medtech has been a conservative industry with comfortable growth and profit margins. In the last several years, however, much has changed. Market consolidation has produced larger players with the means to compete in a wide range of product areas. New cost containment pressures have arisen as medical providers and payors face tighter budgets, cutting into medtech margins.

All medtech companies can lower their costs and create more value for their customers and patients by improving their application of digital technology. The industry has an important role to play in the way medical care is delivered, and with that in mind, medtech companies will need to offer digitally enabled, customer-tailored products and services, collaborating with various partners to distribute their products through integrated horizontal value chains.

As companies become more mature digital players, they will find that increased digitization helps them become more innovative and able to offer cost-efficient solutions to today's and tomorrow's medical needs. Through a digital ecosystem, they will make it possible to provide patient services that deliver better outcomes than ever before at more affordable costs.

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