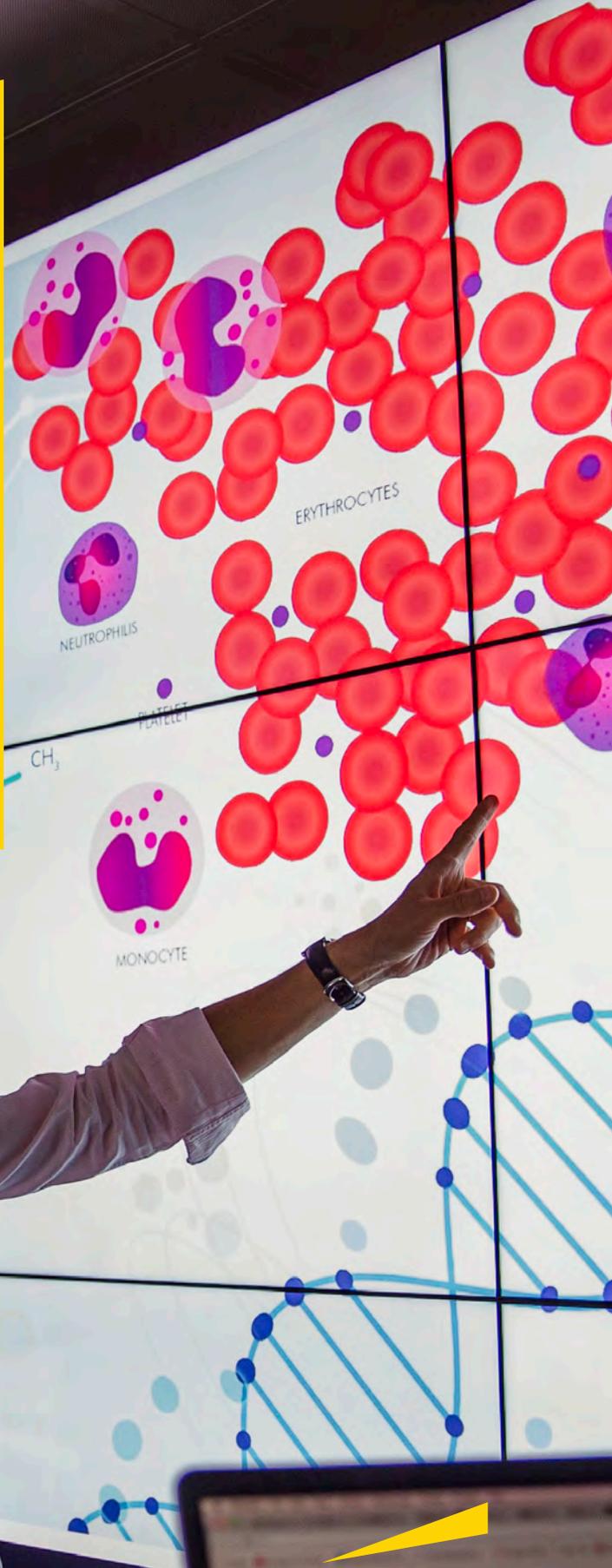


When data and technology expedite growth, how can dealmaking power the value equation?

2019 EY M&A Firepower report
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Executive summary

Context	Trigger	Key question
Life sciences M&A in 2018 was strong but failed to meet market expectations as companies focused on portfolio optimization.	New digitally savvy entrants are disrupting the larger health ecosystem - and life sciences companies' business models.	When data and technology expedite growth, how can dealmaking power the value equation?

In 2019, life sciences companies must accelerate their dealmaking agendas on two fronts:

1

The creation of focused business models

2

The acquisition of digital capabilities

Pace of change

As health care transforms, future value will be created using data and disruptive technologies to fuel innovation.

The pace and scale of dealmaking by payers and providers put **increased pressure on life sciences companies** to respond to new demands with innovative and affordable medicines.

Ten consumer/tech companies have more than **US\$2t in firepower** for deals, more than all life sciences companies combined.

At the same time, life sciences incumbents reported **steady multi-year declines in revenue growth rates**, raising questions about future growth.

Focused business models

To position themselves for the future, life sciences companies must use dealmaking to achieve market leadership in therapeutic areas of interest.

A changing commercial landscape and high fragmentation in therapeutic areas create a **need to build scale without adding portfolio complexity**.

Life sciences dealmaking reached **US\$198b** in 2018. In 2019, **divestitures, bolt-ons and asset swaps** will continue to be priorities.

Portfolio optimization could generate more than **US\$200b** in future M&A as companies exit deprioritized areas.

Digital capabilities

Companies also have to increase investments in digital capabilities and build relationships with key health stakeholders.

Digital dealmaking by life sciences majors has steadily increased since 2014 as companies race to access enabling technologies.

For now, most digital **deals are too small in size and number** to drive transformative change.

An uncertain return on investment and rapid pace of technology change mean companies will **emphasize digital alliances** not M&A in 2019.

1

Who is building
the health systems
of tomorrow
while providing
care today?

Beyond life sciences, 2018 was an active year for dealmaking as health organizations made critical moves outside their traditional business areas to consolidate larger segments of the health value chain. Examples of the trend include the just-finalized merger between CVS Health and the insurer Aetna, and Cigna's purchase of the pharmacy benefits manager Express Scripts.

Much of this activity is taking place in the US, where payers and providers are beginning to respond to Amazon's entry into health care with defensive moves of their own. Although the immediate revenue implications of Amazon's partnership with JPMorgan Chase and Berkshire Hathaway are not obvious, the partnership represents a significant commitment to reimagining health care

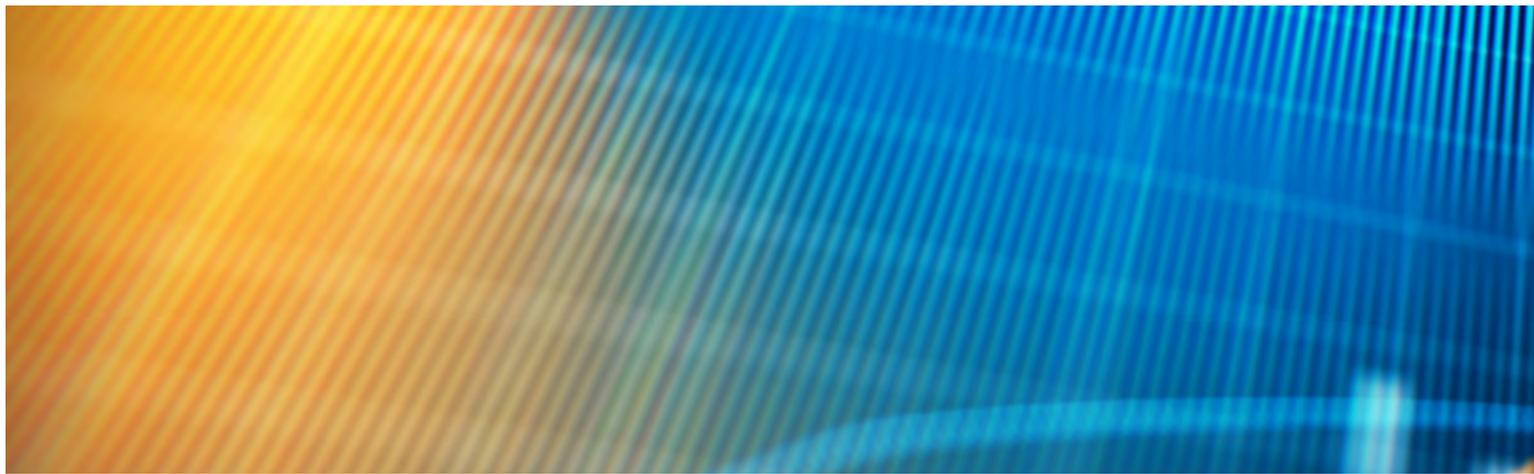
delivery in the US market. Indeed, when Amazon announced it would spend US\$1 billion to acquire PillPack in June 2018, US-based pharmacies and drug distributors lost tens of billions of dollars in market value based on the threat of disruption.¹

Technology players are also investing heavily outside Western markets. According to Li Ma, Senior Vice President of Strategy and External Collaboration, Alibaba Health (AliHealth), the company has already moved from selling online health products to providing one million consultations per day to consumers via a network of more than 24,000 physicians, pharmacists and nutritionists. (See Figure 1 and the perspective, "How AliHealth is creating a consumer-centric health platform for China.")

¹ Sharon Terlap and Laura Stevens, "Amazon Buys Online Pharmacy PillPack for \$1 Billion," *The Wall Street Journal*, June 28, 2018. Available at: <https://www.wsj.com/articles/amazon-to-buy-online-pharmacy-pillpack-1530191443>.

Important definitions

- ▶ The **growth gap** is the difference in the sales growth of a biopharma company or biopharma subsector (e.g., big pharma) relative to overall drug market sales. It is based on consensus estimates of company sales relative to Datamonitor Healthcare's global drug market estimates.
- ▶ **Firepower** measures a company's capacity to do M&A based on the strength of its balance sheet. Together, a company's market capitalization, cash equivalents and debt capacity provide the "firepower" for deals. For instance, when a company's market capitalization or cash and equivalents rise, so does its firepower. **Deployed firepower** is the ratio of capital spent on M&A relative to available firepower.
- ▶ **Bolt-on deals** are small- to medium-sized acquisitions that account for less than 25% of the buyer's market capitalization. These deals expand end-to-end capabilities in an existing therapeutic area or provide access to adjacent, high-growth areas.
- ▶ As the name suggests, **transformative M&A** "transforms" the buyer, providing new market opportunities affecting multiple business units and therapeutic areas. These deals meet one of two criteria: they are greater than US\$10 billion in deal value or affect more than 50% of either company's market share.
- ▶ **Megamergers** are a subset of transformative M&A with valuations above US\$40 billion.
- ▶ Today's **health ecosystem** is populated by a number of different stakeholders that provide goods or services to consumers in an increasingly networked environment. These stakeholders include: providers, who deliver medical care in a range of settings such as the home, the clinic and the hospital; payers, which comprise both public and private entities; and a range of businesses, including technology, retail, telecom, mobility and life sciences companies.



As the lines between health and technology continue to blur, many life sciences companies will face significant challenges to their business models.

While the top-line statistics are eye-catching, they don't fully illustrate the transformation underway, a theme explored in ***Life Sciences 4.0: securing value through data-driven platforms***. Consolidation at the payer and provider level gives these groups more power when determining product access. This, in turn, puts more pressure on life sciences companies to respond with new innovations at affordable prices.

The recent and ongoing entry of consumer-focused, digital companies into health care also increases the urgency for life sciences companies to act. Using their connected devices, data analytics skills and deep consumer relationships, these new entrants are positioned to have access to important real-world data that could, in part or in full, determine future product utilization and payment. In mid-September, for instance, Apple announced its newest watch incorporates an electrical heart rate sensor that can take an electrocardiogram (ECG) using an app that has been granted a De Novo classification by the U.S. Food & Drug Administration.²

Other technology companies are also developing data-rich platforms that make it possible to combine data generated in the traditional clinical context with insights coming from individuals' daily lives. According to Jessica Mega, Chief Medical Officer of Verily Life Sciences, a subsidiary of Alphabet, this was a key reason why Verily initiated the Project Baseline study, along with Duke University School of Medicine and Stanford University. "Our goal is to explore the dynamic interplay of biological, environmental and social systems, as well as changes in these factors over time. This kind of comprehensive approach is needed to truly improve health outcomes," she said in an interview with EY.

As the lines between health and technology continue to blur, many life sciences companies will face significant challenges to their business models. Using their biological and chemical know-how to create novel drugs and devices, these companies have generated unprecedented value over the past three decades. Will future value be created the same way? Or will big data and analytics capabilities be essential for success? What if, as Alex Gorsky, the Chief Executive Officer of Johnson & Johnson, posited at the September 2018 Wells Fargo investor conference, those data and analytic skills "become even more critical" than the clinical and development skills engrained in the DNA of incumbent life sciences companies?

² Press release. "Apple Watch Series 4: Beautifully redesigned with breakthrough communication, fitness and health capabilities," Apple, September 12, 2018.



Figure 1. The transforming health ecosystem

Outside of life sciences, payers and providers were active dealmakers in 2018. Any one of the deals highlighted here could change how health care is delivered and paid for in major markets such as the US and China. The pace and scale of these deals increases the pressure on life sciences companies to adapt to the shifting landscape.

January 2018	February 2018	March 2018	April 2018	May 2018	June 2018	July 2018	August 2018
<p>Amazon (e-commerce) + JPMorgan Chase (Finance) + Berkshire Hathaway (Investor)</p> <p>Alliance</p>	<p>Amazon (e-commerce) + Perrigo (Over-the-counter)</p> <p>Alliance</p>	<p>Cigna (Insurer) + Express Scripts (Pharmacy benefits)</p> <p>Acquisition</p>		<p>AliHealth (e-commerce) + Ali JK Nutritional Products (Pharmacy)</p> <p>Acquisition</p>	<p>Walgreens (Retail pharmacy) + Humana (Insurer)</p> <p>Alliance</p>		<p>Alphabet (Technology) + Oscar Health (Insurance)</p> <p>Investment</p>
<p>Intermountain Healthcare (Health system) leads formation of Civica Rx (Generics)</p> <p>Alliance</p>		<p>Apple (Consumer) + 39 US health systems</p> <p>Alliance</p>			<p>Amazon (e-commerce) + PillPack (Pharmacy)</p> <p>Acquisition</p>		<p>AliHealth (e-commerce) + Guizhou Ensure Chain Pharmacy (Retail pharmacy)</p> <p>Investment</p>
		<p>Google (Tech) + Flex (Digital health)</p> <p>Alliance</p>					

Sources: EY, company filings.



Li Ma
Senior Vice President of
Strategy and External
Collaboration, Alibaba
Health (AliHealth)

How AliHealth is creating a consumer-centric health platform for China

In November 2018, senior professionals from EY sat down with Li Ma, Senior Vice President of Strategy and External Collaboration, Alibaba Health (AliHealth) to discuss its business model and the most exciting health care opportunities in China.

EY: What is AliHealth's near-term focus?

Ma: Our first area of focus is to further grow our health care e-commerce business, which, within 12 months, already provides a plethora of health care products to more than 100 million consumers. Our second focus area is to continue to develop our internet-enabled health care services. We work with health care institutions and have about 24,000 physicians, pharmacists and nutritionists. We provide about one million online services daily to our consumers, including registration, checking test results, payment and consultation.

AliHealth's business model is not confined to traditional e-commerce business-to-consumer interactions. In collaboration with retail pharmacies, we are exploring what in China is known as the "New Retail" business model, which integrates offline and online capabilities. We think it suits health care well. Unlike a traditional e-commerce platform, an e-commerce health care platform can't exist only to sell products. Services such as fast home delivery, the prescription of medicines and information about side-effects are also important.

Health care products are very different from consumer products. When consumers buy retail products, they have enough knowledge to make informed decisions based on price, quality, style, etc. That is not the case in health care,

where specific expertise is required to make good decisions and quality control must meet national regulations. That's why we have put so much effort into creating a team to deliver services, including a mechanism to make sure it is professional.

EY: What are the health care opportunities that AliHealth is seeking to address?

Ma: We think of ourselves as a technology company tackling health care issues. Our vision is to use big data to improve medicine and the internet to reshape health. We want to leverage our strengths in internet technology, cloud computing and artificial intelligence (AI) in our business-to-consumer and business-to-business platforms to address the pain points in China's health care arena. For example, in China, going to the doctor means waiting in multiple long lines at the hospital, first just to register as a patient, then again for the actual services. Getting results requires a separate visit, often on a different day. Online solutions can help reshape this difficult process. Using a cell phone, consumers can register for a physician visit and get a confirmed appointment with an accurate estimated wait time. They can also go online to check their test results or make payments. These internet-enabled tools move the health care ecosystem from today's provider-centric delivery model to one that is more consumer-centric.



EY: How will the technologies you mention help your business model evolve in the future?

Ma: Longer term, intelligent medicine is our strategic focus. Our goal is to use a big data approach to train AI engines within health care institutions to increase physician efficiency, save costs and ensure quality of care. AI is booming in China, but it's far from mature. Still, we've made progress providing AI-based tools to help doctors improve the efficiency or quality of their services, especially in clinics in small villages and towns. As we get access to more data to train the AI engine, I am confident that the supporting tools will be even more helpful.

EY: To fulfill your strategic goals, how will you collaborate with other stakeholders in the market?

Ma: The Alibaba way is to provide a platform and build an ecosystem. It is not about what Alibaba itself can do. For instance, Taobao and Tmall, our consumer-to-consumer and business-to-consumer new retail platforms, are now the largest e-commerce platforms globally, serving more than 600 million annual active consumers. However, we do not carry any of the products ourselves.

A similar concept applies to health care. We want to leverage the internet and big data to build an ecosystem that enables health care institutions, pharmaceutical manufacturers and physicians to deliver better and more efficient health care services to Chinese consumers.

Here's a real life example of how we helped increase vaccination rates for human papillomavirus (HPV). Historical uptake of HPV vaccines in China has been low. Working with two vaccine companies, we used our platforms to reach consumers and increase their awareness of the products. We also provided a seamless reservation service process, both online and offline, for vaccinations.

The project was ultimately so successful that the Chinese Center for Disease Control and Prevention (China CDC) recognized its value and signed an agreement to collaborate with us on vaccination promotion/education for children in China, as prevention is viewed as an increasingly important part of the Government's Healthy China 2030 project.

Unlike a traditional e-commerce platform, an e-commerce health care platform can't exist only to sell products. Services such as fast home delivery, the prescription of medicines and information about side-effects are also important.

In this dynamic environment, it's very likely that life sciences companies will need access to an array of medical and non-medical data to demonstrate value to their various payer, provider and patient stakeholders. Ultimately, these novel data streams promise to transform the way health outcomes are delivered and validated. Indeed, initiatives such as the EY Health Outcomes Platform are already focusing on how to achieve and optimize these outcomes-based transactions.

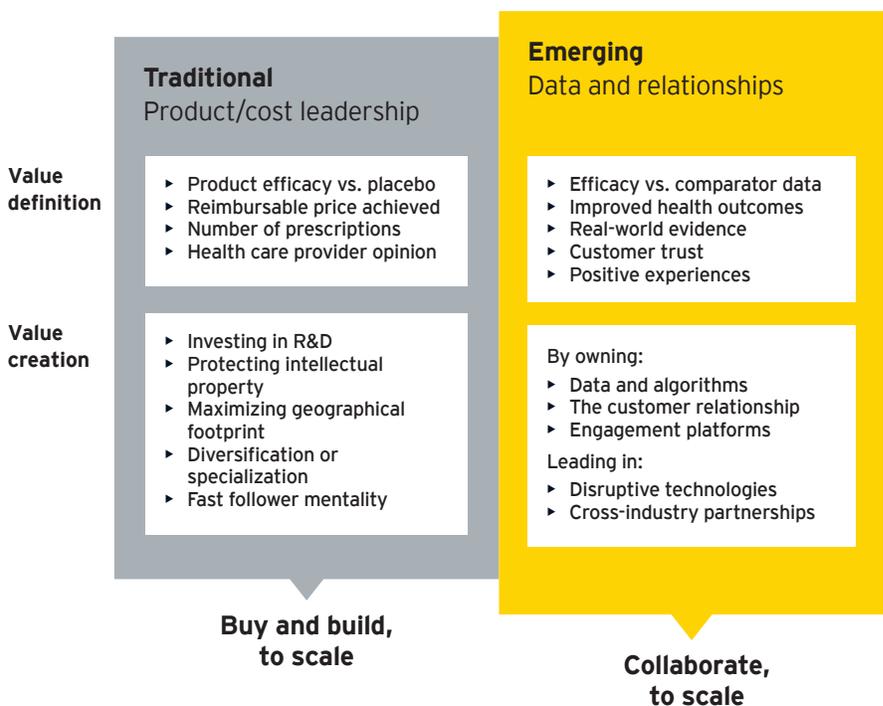
As a result of the "datafication" of health traditional life sciences companies must examine how they gain access to new capabilities, when the return on investment is intuitive but as yet

unproven. In many cases, using data to actually change patient behavior or improve care could require partnering with, or acquiring, companies outside the traditional health care sphere.

As Kieran Murphy, President & CEO of GE Healthcare, notes in an accompanying guest perspective, "The future of health care will see the right data used at the right time in the right way ... to enable more predictive, more efficient and more individualized patient care." (See Figure 2 and "Building the precision health ecosystem" by Kieran Murphy.)

Figure 2. Value creation is no longer just about products, but data and relationships

The life sciences companies most likely to succeed in the future will create personalized and engaging solutions using data and disruptive technologies. To keep pace with the changing environment, M&A to acquire new capabilities is essential.



By integrating data and analytics effectively across the care pathway – from diagnostics to therapeutics, monitoring and throughout care settings – we can offer insights to medical professionals and staff that enable more predictive, more efficient and more individualized patient care.

Kieran Murphy
President & CEO, GE Healthcare



Kieran Murphy
President & CEO,
GE Healthcare

Building the precision health ecosystem

In a world where life expectancy is growing because health care is getting better, large numbers of people are now living with diseases that need to be managed. That means more people are knocking on the doors of health care providers who are simultaneously grappling with a shortage of workers and the need to cut costs. With global health care expenditures now exceeding US\$7 trillion per year, governments and hospitals must eliminate wasted spending and deliver better outcomes. GE Healthcare believes that to meet these challenges, health care needs to become more personalized, more digitally integrated and more collaborative.

The average hospital creates 50 petabytes of data per year - roughly the size of 10 million iCloud storage accounts. This includes clinical notes, lab tests, medical images, sensor readings, genomics and operational and financial data. Yet less than 3% of the data is used.

The future of health care will see the right data used at the right time in the right way. By integrating data and analytics effectively across the care pathway - from diagnostics to therapeutics, monitoring and throughout care settings - we can offer insights to medical professionals and staff that enable more predictive, more efficient and more individualized patient care.

That's why we are partnering with Roche, the leading *in vitro* diagnostics company in the world. *In vitro* tests, whether genetic screens or metabolomics or epigenetic analyses, each individually play an important role in disease diagnosis. But they're a lot more powerful when they're combined with *in vivo* imaging data. The combination of those two modalities, *in vitro* and *in vivo*, allows us to offer a much more integrated analysis of a person's health. We are focused on integrating and embedding this data into devices and workflows already in use today. Busy medical practitioners and caregivers will not readily adopt technology that disrupts their workflows.

Analytics are also helping hospitals operationally, boosting their efficiency so they can continue to deliver high-quality care as patient volume increases. We have installed Command Centers - like an air traffic control facility - in busy hospitals in North America and Europe. Command Centers use algorithms and artificial intelligence (AI) to provide a clear, instant and real-time overview across a hospital to help staff make quick and informed decisions on how to best manage patient care. They bring consistency to processes, help staff prioritize tasks, eliminate duplication and predict tomorrow's pressure points. At a US hospital, patients from other hospitals are now transferred 60% faster, emergency room wait times have been cut by 25% and time spent waiting in the operating theater for a post-surgical bed has decreased by 70%.

As a world leader in health care imaging technology and the largest generator of phenomic data - humans' physical and biochemical information - we see ourselves at the heart of the global health care ecosystem, supporting our customers in the pursuit of precision health, health care that is integrated, highly personalized to each patient's needs and that reduces waste and inefficiency.

Delivering future growth

GE has publicly announced its strategy for GE Healthcare to become a standalone company. While the exact structure of the transaction is still to be determined, becoming a separate company would allow us to be faster in our decision-making, with the scale and portfolio to continue delivering for customers around the world. As is the case now, we continue to look at partnerships, alliances and small, bolt-on acquisitions that align to our strategic priorities.

This is a very exciting time to be working in the global health care industry. The demands and challenges are huge, but our technologies, partnerships and customer relationships position us well to deliver increased capacity, better productivity and improved patient outcomes.

Looming questions about future growth prospects

At the moment, there is little evidence that life sciences companies have suffered meaningful valuation declines by adopting a wait-and-see approach as it relates to accessing digital or other disruptive capabilities. However, there is growing evidence that companies are overly focused on short-term growth metrics, potentially at the expense of longer term and sustained value creation.

Since the 2000s, median year-over-year percentage revenue growth has slowed for the market leaders in all life sciences subsectors. The slowdown is most acute for big pharma and big biotechs. According to analysis by EY professionals, in 2017, the median growth rates of big pharma and big biotechs actually declined five percentage points compared with pre-financial crisis growth rates.

Moreover, since the 2001-2007 era there's also been a drop in the rate of R&D spending and an acceleration in the cash returned to shareholders. Big biotechs have been particularly focused on repurchasing shares. Through the third quarter of 2018, big biotechs have deployed around 20% of their capital to share repurchases, a 6 percentage point increase from the 10-year average. At the same time, an analysis of the industry's M&A activity relative to its capacity to do deals suggests incumbents are using less of their available capital to make acquisitions.

EY defines this dealmaking capacity as firepower. Simply put, it is the ability to do M&A based on the strength of a company's balance sheet, including its market capitalization, cash equivalents and debt capacity. (See the text box "Important definitions" on page 5 and "Methodology" on page 36.) To understand how much of this firepower is being used to make acquisitions, it's instructive to calculate deployed firepower, the ratio of capital spent on M&A relative to available firepower, over time. As of 4 December 2018, life sciences companies used just 16% of their US\$1.2 trillion in available firepower for acquisitions. That's a steady decline from 2014, when companies spent more than 27% of their nearly US\$1.4 trillion in firepower on M&A. (See Figure 3.)

The metrics shown in Figure 3 raise important questions about the growth prospects of life sciences incumbents, especially if biosimilars and the shift to hyper-personalized therapies shrink market sizes in important therapeutic areas such as oncology.

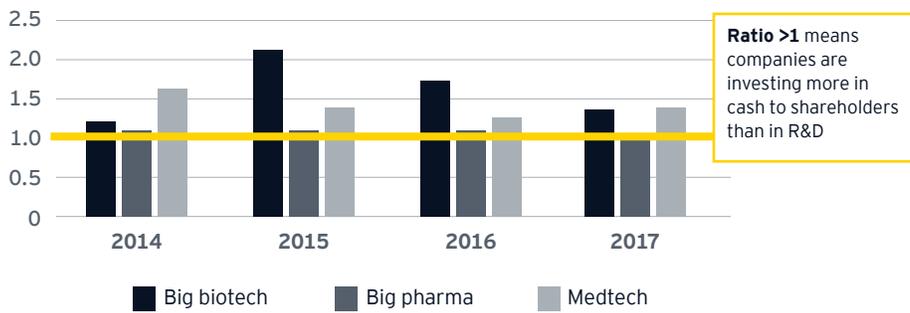
In this environment, the imperative is mounting to use M&A to foster growth potential. Among the topics that should be at the top of the C-suite agenda are which kinds of deals - and which partners - position companies for maximum growth in 2019 and the future.

The imperative is mounting to use M&A to foster growth potential. Among the topics that should be at the top of the C-suite agenda are which kinds of deals - and which partners - position companies for maximum growth in 2019 and the future.

Figure 3. Key metrics raise questions about the life sciences industry's long-term growth prospects

As companies bolster short-term earnings by returning more cash to shareholders, are they investing enough in the future growth activities that will secure their futures?

Cash returned to shareholders increases relative to R&D spending



Firepower deployment

16% Available firepower used for M&A

In 2018, companies tapped just **16% of their available firepower** for acquisitions, down from 27% in 2014.

Sources: EY, Capital IQ. See "Methodology" on page 36 for an explanation of the firepower calculations.



2

In the age of
M&A complexity,
do you pause or
proceed?

Take a look at 2018's life sciences M&A data and it is clear that biopharma and medtech companies have not rushed to acquire, even though they have the capacity to do so. This more restrained M&A environment is surprising given expectations - by almost all market analysts - that new US tax legislation would result in increased deal activity in 2018.

Each year since 2015, EY professionals have predicted life sciences M&A would reach or exceed an annual total of US\$200 billion. In 2018, the total aggregate deal value approached this figure. However, the aggregate deal value through 4 December 2018 is nearly US\$90 billion less than the average M&A total value from 2014 to 2016. One reason for the more restrained climate may be because dealmakers focused on smaller, less transformative deals. In 2018, bolt-on acquisitions comprised 81% of the deal volume and 43% of the total deal value for the year.

The one notable exception in 2018 was Takeda's pending US\$62 billion acquisition of Shire. When finalized, this transaction will position that Japanese pharma as one of the top 10 biopharma companies by revenue. Outside this megamerger, however, big pharma companies spent cautiously in 2018, signing M&A deals with a total value of only US\$42 billion.

Big biotech companies were even more restrained, investing only US\$34 billion in deals, with Celgene's moves to acquire Juno and Impact Biomedicines in January 2018 making up nearly

50% of that spend. After two major transactions in early 2017 (BD's purchase of Bard and the Essilor-Luxottica combination), M&A in the medtech space also slowed in 2018, with companies prioritizing bolt-ons over megamergers.

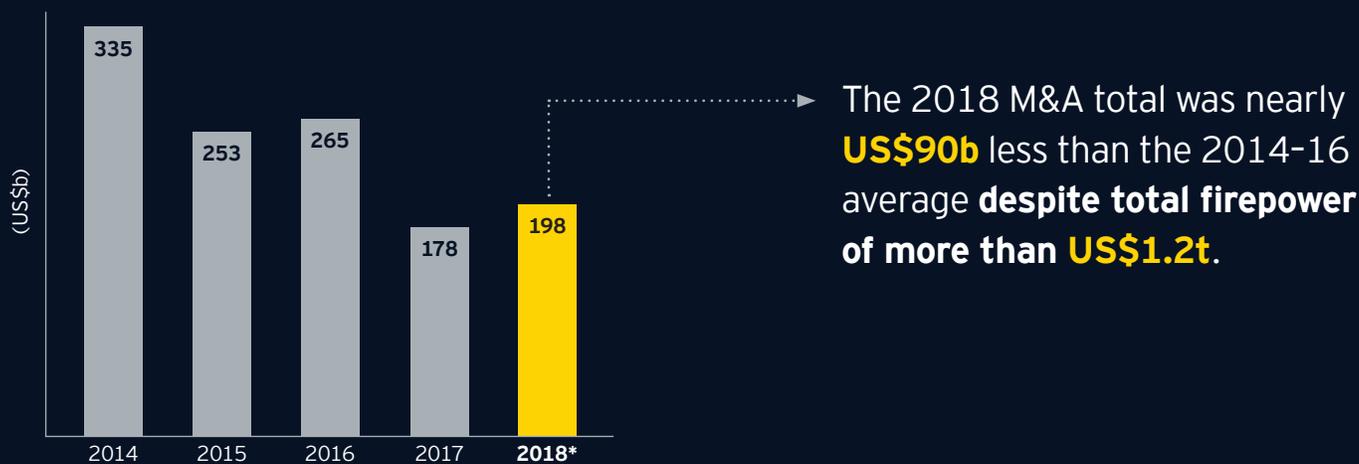
Divestitures were another area of increasing focus in 2018, as companies took advantage of the liquidity in the public markets to sell business units to private equity buyers or create freestanding companies through spin-outs. (See **Creating capital efficiency and shareholder value through divestment in the life sciences sector.**) Johnson & Johnson, for instance, sold its Advanced Products Sterilization and LifeScan businesses, while Sanofi divested its European generics business as competition in that arena accelerated.

At the same time, Eli Lilly and Siemens sought to create value by floating their respective Elanco Animal Health and Siemens Healthineers divisions on the public markets. (Each initial public offering generated more than US\$1 billion.)

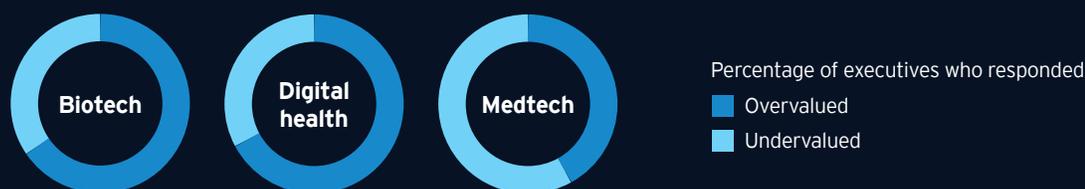
Looking ahead to 2019, we believe that divestitures and spin-outs will be key components of the evolving M&A story. Indeed, management teams from General Electric and Novartis have already signaled publicly their plans to float the GE Healthcare and Alcon divisions if the market conditions remain favorable.

In 2018, dealmakers focused on smaller, less transformative deals. Bolt-on acquisitions comprised 81% of the deal volume and 43% of the deal total.

Figure 4. 2018 life sciences M&A trends and implications



Geopolitical uncertainty and **high prices for assets** are two key reasons there wasn't more dealmaking in 2018.



More than 60% of executives surveyed by an EY team cite the **high valuations of biotech and digital health companies as reasons not to do deals.**

↑ 78%

Increase in market valuations of biopharma companies since 2014

↓ 15%

Decline in firepower of biopharma acquirers since 2014

Companies that wait for less frothy markets may have trouble acquiring growth targets in the future because market valuations of those companies are rising faster than acquirers' firepower.

Sources: EY, Capital IQ.

* Unless otherwise specified, analyses used data as of 31 December. M&A data in 2018 current through 4 December 2018. The date of 31 October 2018 was used to calculate the average firepower of biopharma and medtech acquirers and the average valuations of target companies in 2018. Specific names of target companies and an explanation of the firepower calculation are provided in the "Methodology" section. From 4 September 2018 to 31 October 2018, EY conducted a survey of life sciences business leaders in Asia, Europe and the US to understand future dealmaking trends.

Understanding the 2018 dealmaking environment

With US\$1.2 trillion in available firepower for deals, the quieter-than-anticipated M&A climate wasn't due to cash constraints. To better understand why the M&A observed in 2018 failed to live up to industry expectations, an EY team surveyed business executives from 22 life sciences companies in the third quarter of 2018. These executives represent medtechs, biotech and pharma headquartered in the US, Europe and Japan with combined annual revenues of more than US\$300 billion. Based on survey responses, many acquirers de-emphasized acquisitions due to concerns about the ability to generate potential returns on available assets. (See Figure 4.)

When asked about factors negatively affecting dealmaking, the top two issues cited by respondents were high prices/valuations (68%) and geopolitical and trade uncertainties (62%). Unpredictable and potentially disruptive recent events include the UK's eventual Brexit from the European Union, as well as the rise in protectionist trade policies in the US.

Rising valuations, meanwhile, have driven industry firepower to its current levels. But they have also inflated the price tags for likely acquisition targets, making them prohibitively costly at current deal multiples. Furthermore, after five years of unprecedented market liquidity, many startups, especially biotech developing curative or genetic therapies, are so well capitalized that they are under no immediate pressure to be acquired.

Based on the survey data, some of the themes that played out in 2018 seem likely to apply in 2019. Forty-two percent of respondents expect to do more deals in 2019 than 2018 and the

kinds of transactions will be similar. Small- to medium-sized acquisitions valued at up to US\$10 billion garner the greatest interest; seventy-one percent of respondents believe product-focused innovations and portfolio optimization will be the primary motivations for deals. Only 3% of individuals surveyed listed megamergers or digital acquisitions as their high priorities.

One caveat to this forecast - continued volatility in the stock market, which could presage a larger market correction in the future. On the plus side, this retrenchment should make acquisition targets more affordable. On the negative side, ongoing drug pricing discussions in the US continue to disproportionately affect the valuations of bigger biopharma, and thus, their firepower. As a result, even with the recent correction, the gap between acquirers' firepower and target valuations continues to close. Since the beginning of 2014, for instance, average valuations of biotech targets have increased 78%; during that same period, the average firepower of biopharma acquirers has declined 15%.

As life sciences incumbents struggle to satisfy investors' near-term expectations, they may redeploy even more of their available cash from future growth to share repurchases. If that behavior persists, it could further limit M&A totals, making the M&A totals of more than US\$200 billion achieved in recent years the exception rather than the rule.

When asked about factors negatively affecting dealmaking, the top two issues cited by respondents were high prices/valuations (68%) and geopolitical and trade uncertainties (62%).

3

As therapeutic depth becomes more important, are you focused on the right opportunities?

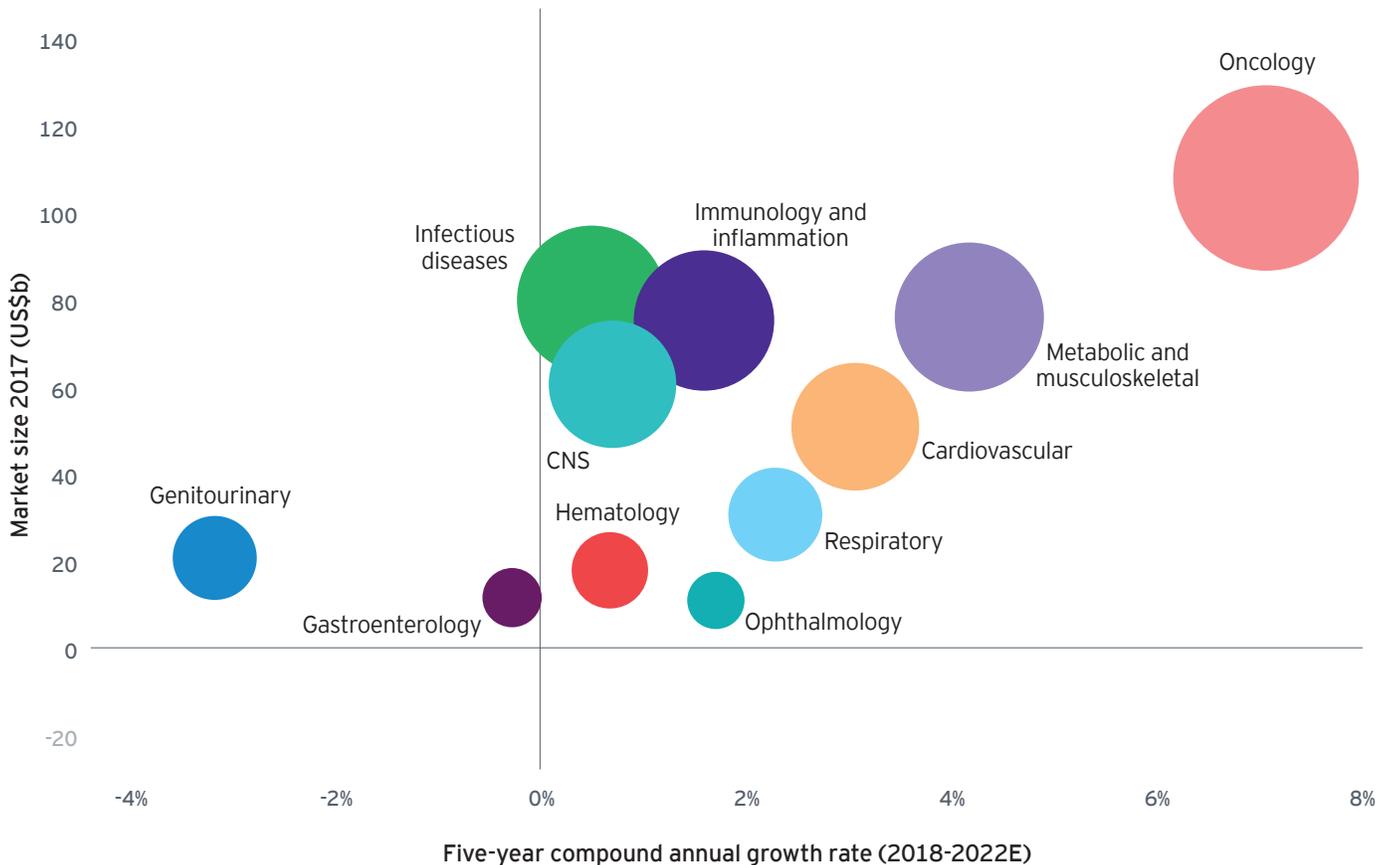
Life sciences companies that want to use M&A to drive revenue growth in 2019 must take into account the complexities of today's market when setting their strategies. (See Figure 5.)

Even therapy areas with high unmet need - for instance, infectious disease and central nervous system disorders - have low compound annual growth rates because of pricing pressures and the difficulty of identifying next-generation therapies that offer significantly better health outcomes.

For now, oncology stands apart as the largest and fastest-growing therapeutic area. Overall, the global market for oncology therapeutic medicines is predicted to reach US\$150 billion by 2022, according to Datamonitor Healthcare. But oncology is also the most crowded therapeutic area, and biosimilars and generics will increasingly compete with brands for market share. As a result, not all the companies developing therapies in this lucrative market are going to be winners, especially the companies with smaller, less differentiated pipelines.

Figure 5. Biopharmas in fast-growing therapeutic areas have a growth advantage - for now

Oncology stands apart as the largest and fastest-growing therapeutic area. Even companies in this space will face pressure due to biosimilar competition and the rise of new treatment modalities.



Sources: EY, Capital IQ, Datamonitor Healthcare.

The importance of focus in the digital age

For companies that want to use M&A to drive revenue growth, there is growing evidence that businesses with more focused portfolios are more likely to outperform their less focused counterparts. The discussion about focused versus diversified business models is hardly new. But, as outlined in the ***Life Sciences 4.0: securing value through data-driven platforms***, the potential impact of digital technologies - and the urgency to invest at sufficient scale in new data and analytics capabilities - makes the debate more pertinent than ever.

In the past, diverse portfolios offered a hedge against the vagaries of an unpredictable R&D cycle. With comparatively little pressure on reimbursement, the path to revenue growth was more straightforward - bring in new products regardless of the therapeutic area. As commercial pressures have grown, we believe success is no longer simply about selling more products. It now also requires demonstrating improved patient outcomes in the real world.

Companies hope to use new technologies such as AI to reduce the uncertainty or to identify and interpret patterns across the life sciences value chain. But as companies embed these digital technologies into their organizations, several issues have become clear. First, acquiring these skills is expensive; second in the short-term, it may be difficult to quantify the return on investment using traditional metrics; third, depending on the actual business model, some capabilities are significantly more important than others.

We believe that digital tools that enable more efficient real-world data capture, analysis and interpretation will give all stakeholders greater clarity on which products deliver optimal outcomes. For

companies that want to differentiate themselves based on the outcomes their innovative products deliver, these digital tools will become disproportionately more important. So, too, are digital tools that accelerate costly aspects of drug development, especially clinical trial recruitment and monitoring. In contrast, the digital tools most important to companies developing products for chronic diseases such as heart disease, diabetes or asthma may be those that improve the consumer experience and adherence to therapy.

To keep pace in the current climate, it's likely that diversified businesses will need to make large scale, but different, digital investments simultaneously across their various businesses. As digital technologies become the status quo, companies that have already made their therapeutic bets will be better positioned to accelerate revenue growth using these new skills.

Companies with more therapeutic focus outperform less focused peers

To understand the linkage between therapeutic focus and overall performance, EY researchers analyzed the financial results of 25 top biopharma companies across six different metrics. Companies that generated at least 50% of their biopharmaceutical revenues from one therapeutic area were classified as more focused; companies that didn't meet this threshold were less focused. In order to make meaningful revenue comparisons, EY researchers did not account for further diversification outside the biopharma setting (e.g., contributions of a consumer health or animal health business).

Across every indicator, the EY analysis shows that the 10 more focused companies outperformed the 15 less focused organizations. Indeed, more focused companies reported average

As digital technologies become the status quo, companies that have already made their therapeutic bets will be better positioned to accelerate revenue growth using these new skills.

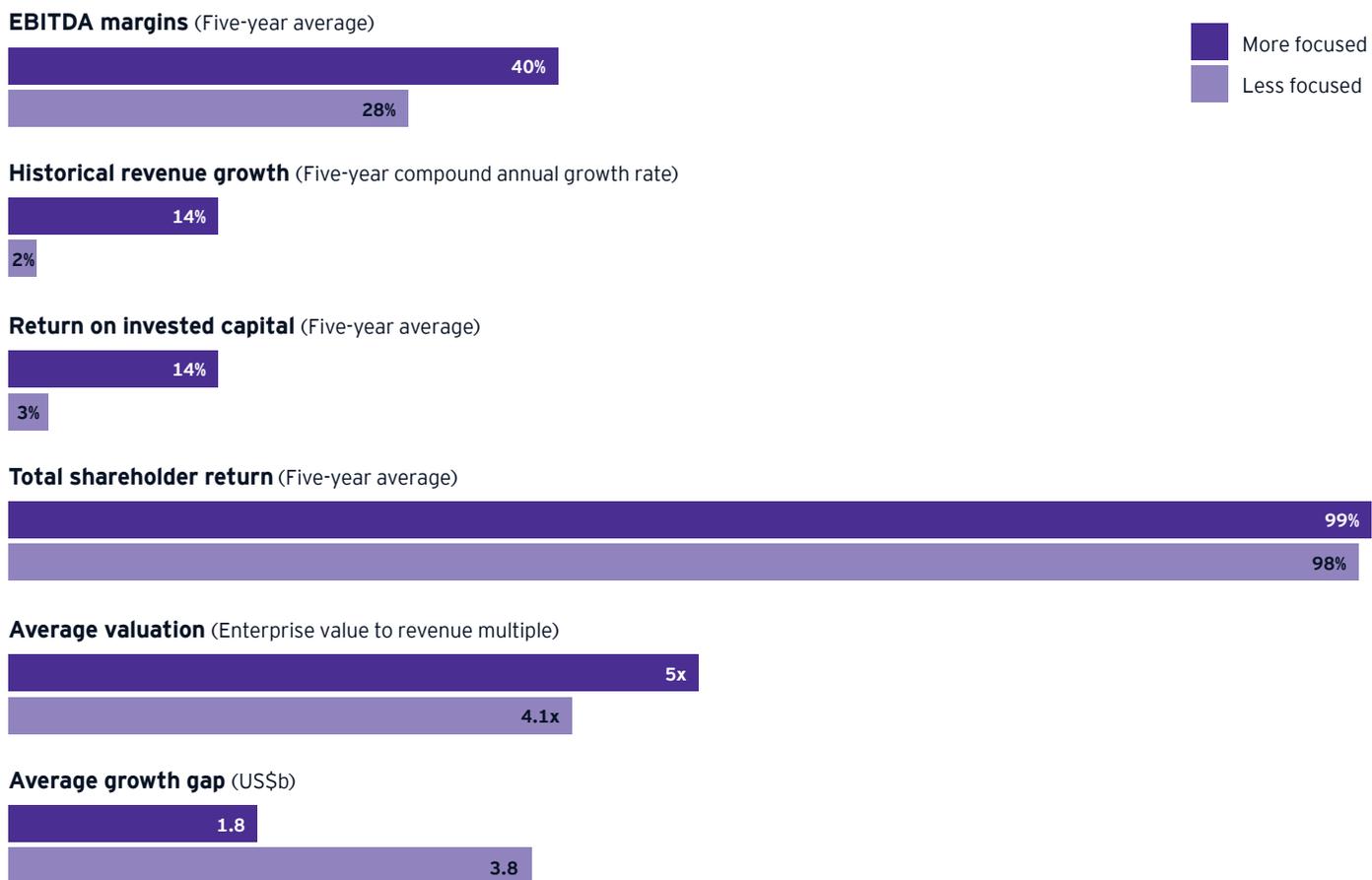
five-year historical compound annual growth rates that were 7 times higher than their less focused peers; the average return on invested capital, which helps benchmark how well companies use their money to generate returns, was 4.5 times higher for the more focused group than the less focused one. In addition, less focused companies are more likely to encounter larger growth gaps. Indeed, the total growth gap in 2018 of the less focused cohort is US\$57.4 billion, compared with just US\$18 billion for the more focused group. (See Figures 6 and 9.)

These data are an important counterargument to the claim that megamergers are the logical and easiest path to improved performance. Indeed, the analysis suggests that the industry's current focus on bolt-ons and portfolio optimization is not only rational, but the best possible use of M&A dollars.

Recent history supports this notion. In 2008, Novartis sought to diversify its portfolio, purchasing first a stake in Alcon and then the entirety, to build revenue growth through products sold direct to consumer and private-pay channels. But it was never obvious how the more traditional pharmaceutical business and Alcon, when combined, would add strategic value to the greater global organization. Novartis' announcement in June 2018 of its intention to unwind the Alcon transaction and spin it out suggests the complexities of running two diverse businesses under one organization now exceeds the value that can be created from such diversity. Biogen went through a similar process when it merged with Idec in 2003, acquiring an oncology portfolio that it then divested in 2010 in order to refocus on its core central nervous system (CNS) business.

Figure 6. In 2019, dealmaking to create focused business models will remain an imperative for biopharmas

When the operational and market performance of 25 leading biopharmas were analyzed, more focused companies, on average, outperformed less focused companies on all six metrics evaluated.



Sources: EY, Capital IQ and Datamonitor Healthcare. Companies were classified as more focused or less focused based on the following criterion: if one therapeutic area contributed more than 50% of a company's biopharma revenue, it was classified as more focused. If 50% of a company's biopharma revenues came from two or more therapeutic areas it was classified as less focused.

Market fragmentation likely to drive additional deals

With large-scale dealmaking resulting in the consolidation of life sciences companies' major customer groups, there's been a shift in power away from life sciences companies to payers and patients. At the same time, it's become more difficult for companies to engage busy physicians, their historic customers, about the value of new drugs and devices. Indeed, the ability to use data to engage stakeholders across multiple channels is one of the primary reasons driving life sciences companies' interest in digital today.

For these reasons, the current fragmentation of the life sciences companies is worth noting as another potential driver of M&A. Consider the following statistics:

- ▶ No single company holds more than 5% share of total market revenues
- ▶ The top 20 companies together hold only 51% of the total market share
- ▶ This fragmentation is observed across multiple individual therapeutic areas, especially oncology

In oncology, for instance, only Roche holds more than 20% of the market, and, according to Datamonitor, its share is projected to drop below this threshold by 2022 as competition from biosimilars and new modalities grows.

In immunology and inflammation, AbbVie and Johnson & Johnson command 41% of the total market currently, but their combined share will drop to 38% in 2022 based on Datamonitor's forecasted sales growth.

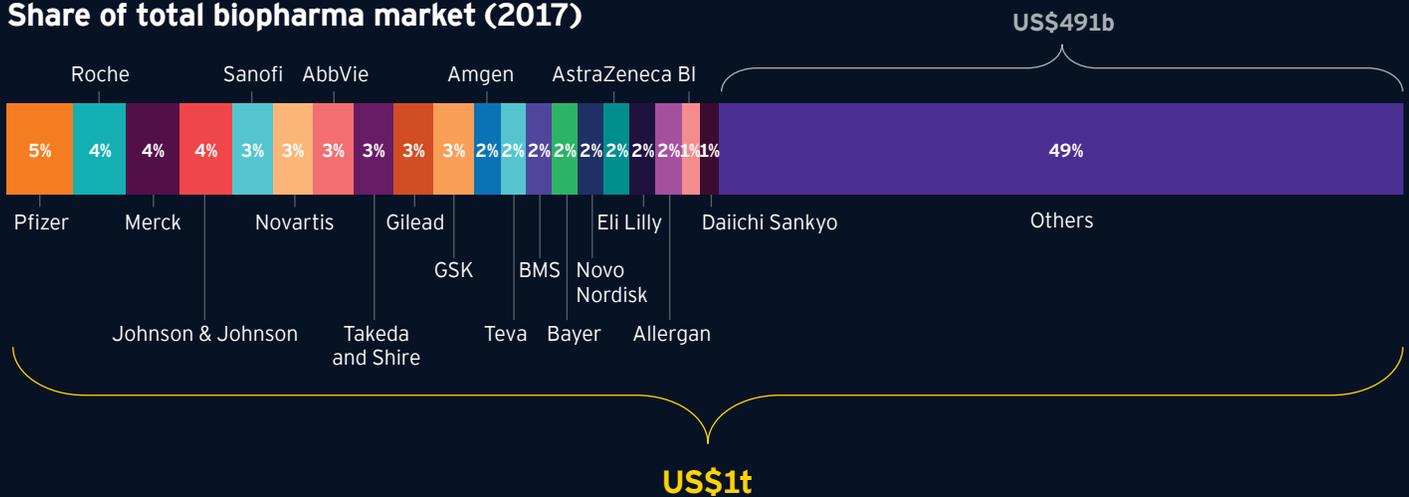
In addition, it's highly likely that these percentages understate the actual current level of fragmentation in the market since they are calculated using market estimates that may not capture the entirety of pharmaceutical sales across all life sciences companies and geographies. (See Figure 7.)



Figure 7. Market fragmentation could create more than US\$200b in M&A opportunities

The biopharma industry remains highly fragmented. As therapeutic focus becomes more important for commercial success, companies may need to use dealmaking to build dominant positions in strategic therapy areas. Modeling using conservative asset valuations suggests **portfolio optimization could result in more than US\$200b M&A if companies were to divest assets associated with just four therapeutic areas.**

Share of total biopharma market (2017)



US\$491b

	Oncology	Immunology and inflammation	Infectious disease	Cardiovascular disease
Aggregate revenues of divestiture candidates	US\$18.5b	US\$13b	US\$8b	US\$14b
Potential revenue multiple	5x	5x	3x	4x
Potential asset value	US\$93b	US\$65b	US\$24b	US\$56b

US\$238b
Potential M&A value from portfolio optimization

Sources: EY, IOVIA and Datamonitor Healthcare. Revenues at Johnson & Johnson and Takeda include revenues from recently acquired Actelion and Shire respectively. Modeling assumes assets are divestiture candidates if owners' revenues total 3% or less of total therapy area revenues.

4

How can you use dealmaking today to capture value from data tomorrow?

For now, there is little evidence suggesting that life sciences companies have fully embedded digital collaborations into their overall strategies. John Carlson, President of Flex Health Solutions, a division of Flex that is creating infrastructure to safely share medical data, believes some companies are trying to take a more holistic approach, but most efforts remain pilot programs. In part, the reluctance to invest in efforts that will transform business models stems from what Carlson says “is a belief that the historic product-centric business model, in which companies sell a device or a drug rather than an outcome, will continue to drive significant profit.” (See “Building a digital backbone for health data.”)

An EY analysis of digital deals by life science incumbents supports the assertion that, with a few exceptions, life sciences incumbents are not focused enough on building their digital capabilities. Acquisitions remain the rarity as companies focus on creating product-specific solutions instead of embracing a fundamental belief that data and evidence will make their businesses more successful. In addition, the lack of disclosed deal terms suggests the overall level of investment is more limited as well, at least relative to traditional sources of innovation.

That doesn’t mean life sciences companies are completely ignoring the disruptive possibilities of digital health. (See Figure 8.) Johnson & Johnson, for instance, is actively partnering with new organizations via its JLABS incubators.

“This is an important area for us and we therefore need to deepen our technological and data science capabilities. We also need to continue to do what we are good at. By working closely with innovators, we continue to learn and can help accelerate solutions that enable better, more preventative care,” says Melinda Richter, Global Head of Johnson & Johnson Innovation, JLABS.

And Johnson & Johnson is hardly the only company surveying the landscape for digital technologies. In 2019, EY professionals anticipate that digital dealmaking will continue to accelerate as the opportunities to combine and use data to improve health outcomes become more obvious.

Figure 8. “Digital” deals could provide additional growth, but biopharmas need to accelerate their efforts

347

The number of digital deals signed by life sciences incumbents between 1 January 2014 and 16 November 2018



The percentage of digital deals driven by the need to improve disease management and R&D efficiency



The percentage of biopharma digital deals in oncology, central nervous system disorders and diabetes



The percentage of total digital deals signed by the two biopharma leaders, Novartis and Roche

Sources: EY, Capital IQ, Informa's Strategic Transactions and company filings.



John Carlson
President, Flex
Health Solutions

Building a digital backbone for health data

In today's health environment, new opportunities to improve health for individuals are being created as consumer and medical technologies intersect. These opportunities are data-driven. By combining traditional medical data with data that aren't health related, it's possible to paint a more complete picture of a person's health. It's also possible to personalize the care experience for that individual, using the data that are most meaningful to drive actual behavior change. Diabetes and congestive heart failure are two conditions where rich data streams are beginning to have an impact. As the number of medical-grade connected devices grows, there will be even more opportunities to use data to improve outcomes.

Life sciences companies are well aware that future success depends on access to meaningful health data. However, it's been difficult for them to understand which technologies will actually generate the data that will drive action on the part of the patient or the provider. That has resulted in a lot of time and money

spent exploring data connectivity and sensor technologies, as well as the creation of branded apps and education portals. While those apps and portals provide important patient information, the material can't easily be incorporated into the doctor's workflow. Because of this, the likelihood that a physician will use the information is almost zero.

These brand-specific solutions create challenges for patients too. It's rare that a patient has a single condition. The proliferation of different digital tools requires patients to enter information across as many as four or five apps. There's good evidence suggesting the first time you ask a patient to use a tool, engagement will be about 50%. If individuals are required to input information multiple times, that engagement drops off completely.

What's required for health data to flow more freely is a digital backbone that is capable of moving data from a connected device to the cloud for analysis and back to physicians and

To understand how digital deals will evolve, pay attention to what's happening in oncology and diabetes

For now, most of the digital activity is linked to developing brand-specific solutions in the diabetes and oncology areas. In the intensely competitive diabetes field, existing market leaders have all turned to digital platforms to defend their market territory. The goal is to combine smart algorithms with intuitive design to improve the patient experience and inspire brand loyalty. At the same time, digital diabetes treatments such as WellDoc's BlueStar have shown that applied behavioral science can be as clinically effective as drugs, reducing blood glucose levels by an average of two points within three to six months of use.

Given that oncology is driving an ever-greater proportion of life sciences revenue growth, it's no surprise that companies are beginning to invest in digital platforms, both open and closed, to access relevant data. In 2018, two of the most important signposts of the digital future were Roche's acquisition of Flatiron Health and the joint venture between Merck KGaA, Darmstadt,

Germany and Palantir, Syntropy, to create a collaboration platform for research and discovery.

Specific financial details of Syntropy, which is a collaboration between the Merck KGaA, Darmstadt, Germany affiliate EMD Digital and Palantir, remain undisclosed. The collaborators aim to create a data integration platform that will speed research and improve care. The two organizations realized that health systems are generating vast amounts of data but most of it goes unused, according to Simon Sturge, Executive Vice President and Head of Business Operations and Strategy, Healthcare Business of Merck KGaA, Darmstadt, Germany.

"We felt there was value – for both science and ultimately patients – in building a system that could make those data accessible and usable to research groups within health organizations," says Sturge. (See "Embracing the real-world data opportunity.")

patients to inform care. This backbone needs to be robust; data transport needs to be rapid and secure. That means building a system that complies with current regulatory standards for both cybersecurity and patient privacy. This need became the genesis for our BrightInsight platform, which can be thought of as medical grade infrastructure for data transport and sharing.

BrightInsight is an open system - the goal is to aggregate data from multiple sources, analyze it and then feed the information back to patients and providers, while still meeting all the security and regulatory requirements. At Flex, we have had the opportunity over the past two decades to partner with a range of life sciences clients on the design of medical products. Why should they spend time developing infrastructure when the differential value they bring is their understanding of the clinical meaning of the data? Our aim is to solve the technology problem and enable life sciences companies and physicians to solve the clinical problems more seamlessly.

Jumpstarting the business with data

Increasingly there are massive data streams that aren't specifically health related that could be used to improve patient outcomes. One of the challenges for life sciences companies is tapping into these different data streams. Think about a patient who has recently had knee replacement surgery. Motion detectors that passively measure the person's activity levels provide important data that informs a care team of the individual's post-surgery recovery.

Medtech and biopharma companies believe technology can help them build a better relationship with the individual consumer. But in many cases, the ultimate goal is to achieve greater utilization and higher compliance of a specific product. That's not what patients want, however. Patients want a personal experience. The life sciences industry is going to have to respond to this demand in the future.

For now, the marketplace still supports the old business model: companies can sell their individual devices or their pharmaceutical products and make a significant profit. It's an open question as to how long the old business model will hold. What happens when life sciences companies have to sell outcomes and not products? If they are going to move in that direction they need a broader set of data.

As technology companies move into health care, they aren't focused on protecting the old business model. And they can move more rapidly into this space given their scale and existing capabilities. One priority for life sciences companies near term is opening their eyes to what's happening outside of the medical realm.

Roche's acquisition of Flatiron Health, meanwhile, gives the big pharma access to two different capabilities: first, technologies and services that matter to oncology care providers; second, data to accelerate development and commercial efforts.

The US\$2 billion Roche spent on Flatiron Health might seem hefty given Roche's ability to use the platform to differentiate its products relative to competing medicines remains unproven. However, compared to the decade of development time and the billions required to bring a drug to market, the acquisition price appears quite reasonable, especially when considering possible upsides. Indeed, naysayers who view the deal purely in terms of Roche's ability to drive use of its own products are missing an important potential driver of the deal.

As Flatiron Health's data set deepens and new provider and payer stakeholders contribute to it, the platform itself becomes a linchpin for how the wider oncology ecosystem functions. In this way, Roche can use the Flatiron Health platform to position itself at the center of a data-rich network that will grow even more valuable as the number of users grows.

Over time, competitors will face the hard choice of spending money to build a competing network or joining forces with Roche to take advantage of its existing network. As a first mover, Roche will be uniquely positioned to become the oncology partner of choice - for payers, providers, patients and biopharmas with cutting-edge therapies. Cast in those terms, the price tag for Flatiron Health begins to look less exorbitant.



Simon Sturge
Executive Vice President
and Head of Business
Operations and
Strategy, Healthcare
Business of Merck
KGaA, Darmstadt,
Germany

Embracing the real-world data opportunity

I am most excited about our ability to use new technologies to change behavior and improve individual outcomes. By using connected devices and apps that monitor peoples' behavior in real-time, we can collect data on a daily basis, not just when patients visit their physicians. Advances in machine learning, meanwhile, allow us to correlate these emerging data with disease progression long before symptoms become visible. As a result, there is an opportunity to intervene much earlier, and give individuals greater control of their health.

Some biopharma companies may find these technologies threatening. I think technology and health care have always been interlinked. Whether we are talking about a stethoscope or a wearable device, the practice of medicine has always relied on technologies that capture data to inform diagnoses and treatment plans.

We shouldn't be afraid of the changes that are coming to our business as more data becomes available - in fact it's absolutely the opposite. Within the Healthcare Business of Merck KGaA, Darmstadt, Germany, we believe it is essential to embed the use of data analytics across every aspect of our business. More specifically, the growing volume of real-world data is relevant to three of our core functions: first, interacting and educating patients about disease symptoms; second, using data to become a trusted partner to physicians; and third, improving internal research and development efforts.

Today it isn't a question of whether we, as a pharmaceutical company, need real-world data. But there is a difference between accessing and using the data and owning the digital technologies that allow us to fully understand and leverage the data in a meaningful way. We don't necessarily see ourselves becoming a digital health care company. We believe

that other companies may be better placed to build the infrastructure. Instead, we want to collaborate with these external parties in the areas of disease and health that are our core priorities, in order to become a digitally enabled health care company.

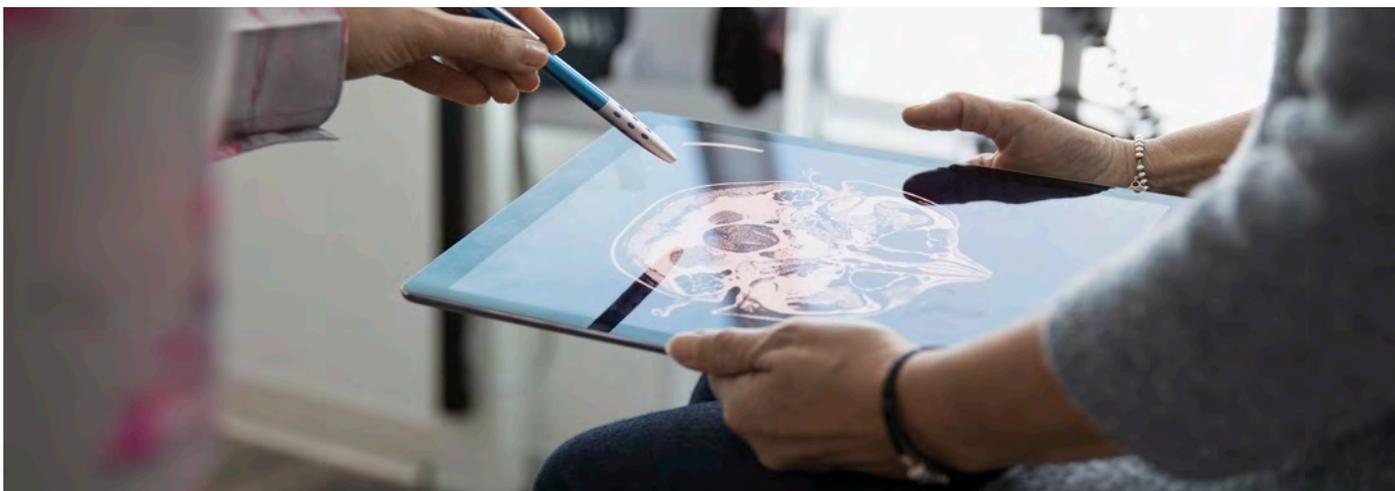
The partnering principle

It's very early days for digital collaboration. At Merck KGaA, Darmstadt, Germany, we have had dialog with a number of potential partners. Those conversations have resulted in a few pilot programs, some of which we've expanded as the benefits in health outcomes become more apparent.

For instance, several years ago we began working with the big data firm Palantir on a number of different programs, including understanding primary prescription sales in China. As the relationship developed over time, both sides gained confidence in what the two organizations could achieve working together. That confidence resulted in Syntropy, which is a joint venture between the Merck KGaA, Darmstadt, Germany affiliate EMD Digital and Palantir.

Announced in November 2018, Syntropy is an extension of our belief that analyzing data is a core capability for science and technology companies. In discussions with hospitals and research organizations, we realized that these institutions generate significant amounts of data that are of huge value if shared.

Most of the time, however, these data are never used, because they aren't accessible for analysis. Palantir and EMD Digital believe there is value in building a data integration platform that allows the scientific community to structure and analyze data from different sources to identify new research insights that advance patient care.



Because there are strict governance requirements for how pharmaceutical companies treat patient data, we have created defined boundaries between Syntropy and our existing health care business. As Syntropy's capabilities expand, our Healthcare business is interested in becoming a customer of the joint-venture, leveraging data from the platform to accelerate our own research efforts.

The platform opportunity

As a pharmaceutical company, we are continually looking at where our role in care delivery ends and the role for physicians begins. Diabetes and fertility are two areas where we feel significant responsibility not simply to treat disease, but to keep individuals healthy. We see an opportunity to help facilitate important care interactions using digital tools such as our prediabetes solution, which we've deployed outside the US using Blue Mesa Health's platform. This solution is a year-long program

that uses a smart phone app to provide remote coaching and peer support to help individuals with prediabetes make lifestyle changes and avoid the onset of Type 2 diabetes.

Digital tools are adopted faster if they are brand neutral. We don't create them to sell more of a specific product. Instead, we benefit by getting access to real-world data and by building patient awareness. It's very important to us that patients understand their disease.

As platform-based business models emerge, there is an opportunity to do even more. But it's important to have a clear endpoint. Within the Healthcare business of Merck KGaA, Darmstadt, Germany, we believe we can differentiate ourselves and our products by better understanding cause and effect, e.g., what causes a disease to advance and what interventions, whether behavioral or pharmaceutical, might prevent this progression. Our participation in platforms should focus on how to achieve this knowledge.

Today it isn't a question of whether we, as a pharmaceutical company, need real-world data. But there is a difference between accessing and using the data and owning the digital technologies that allow us to fully understand and leverage the data in a meaningful way.

5

Innovation or growth? How can you use your dealmaking firepower to do both in 2019?

As we outlined in *Life Sciences 4.0: securing value through data-driven platforms*, it's not clear which organizations will build and control the digital health ecosystems of the future. If life sciences companies want to play a central role in that process, we believe they should consider three different dealmaking options in 2019. These options are:

1. Continue to seek scale in their target therapeutic areas through focused M&A and alliances
2. Partner with other health care stakeholders to access and use data to improve outcomes
3. Partner with, or acquire, digitally focused, data-centric companies to improve the efficiency of R&D and better differentiate marketed products with evidence

These are not mutually exclusive options. Indeed, focusing on fewer therapeutic areas is a necessary first step to creating agile, more competitive businesses and building deeper relationships with key health stakeholders. Moreover, partnering with health care stakeholders won't be very efficient if life sciences companies choose not to use dealmaking to bolster their data capabilities as well.

In truth, the most successful companies are already pursuing all three options to create end-to-end capabilities. To optimize revenue performance in the future, it will be even more important to invest in the data and analytics capabilities that align with their actual business models.

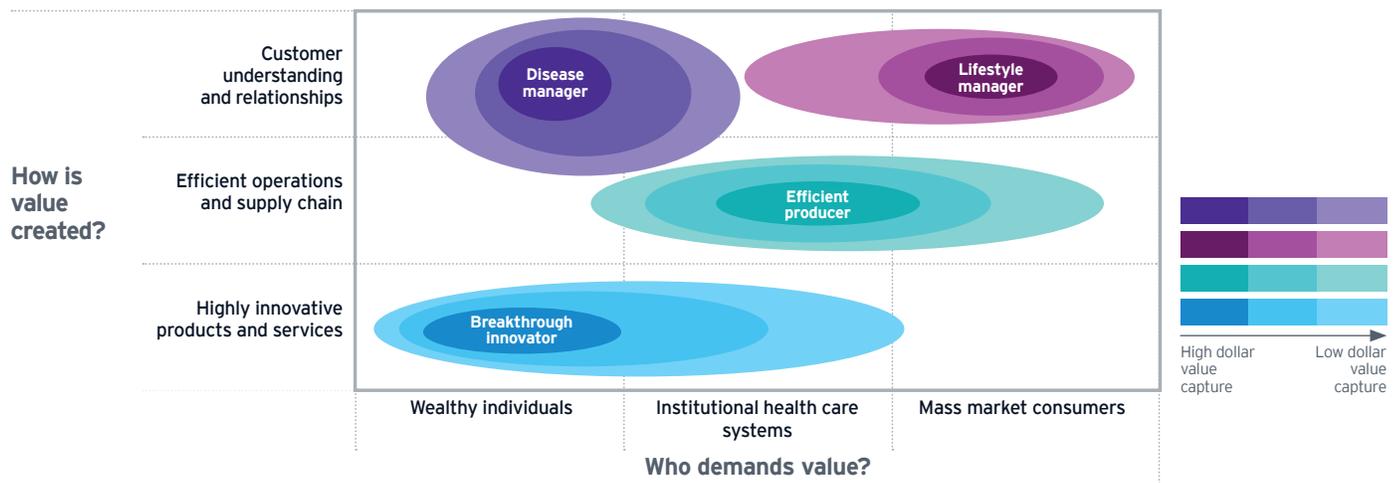
Currently, most major life sciences companies or business units can be described by one of four broad business models:

1. Breakthrough innovator: Developer of best-in-class products that command high prices and are primarily paid for by health insurance
2. Disease manager: Developer of products and solutions to manage chronic conditions end to end
3. Efficient producer: Developer of lower cost products that perform as well as the competition
4. Lifestyle manager: Developer of products aimed at prevention and overall health maintenance sold directly to the consumer

For each of these business models, companies must differentially invest in the tools and disruptive technologies that allow them to respond to the changing demands of their patients, payers and health provider customers. (See Figure 9.)

Figure 9. Value creation opportunities by business model

As companies respond to evolving customer demands their total market value will shift in ways that depend on their chosen business models. They will increasingly need to use data to predict future customer demands so they can adapt to the dynamic health care landscape.



Source: EY. Concept developed from an initial idea first profiled by Prof. Brian D. Smith in his book, *The Future of Pharma*, published by Gower Publishing in 2011.

Three different parameters define value creation (y-axis): innovative products, efficient operations and customer understanding. The x-axis corresponds to which health stakeholders are defining the value: wealthy individuals, health care systems and mass market consumers. The area of the ellipse corresponds to dollar value of the total addressable health services market captured by companies employing a particular business model. The color gradient correlates with the increased opportunity for value capture (US\$). The darker the color, the greater the opportunity for value capture.

Consider Merck & Co. Inc's ambition to leverage its blockbuster anti-PD1 therapy Keytruda to become a powerhouse in oncology. According to Datamonitor Healthcare, Merck had about 3% of the total oncology market in 2017 and should see that share increase to 5% in 2022 as the use of Keytruda expands.

In recent years the company has partnered with or acquired a number of biotechs to expand its therapeutic arsenal. It has also deepened its access to data by genetically profiling clinical trial participants. Additional investments in oncology-specific data and customer engagement capabilities could further strengthen its position in the oncology market.

The road map to future growth

As networks of relationships and therapeutic focus become more important for commercial success, we believe it will become increasingly more difficult for companies with market share in the low single digits to differentiate their products to payers and providers. In 2019 and 2020, these companies should consider using divestitures and asset swaps to unlock value now before the competitive bar for success is raised even higher.

The modeling suggests portfolio optimization in just four therapeutic areas - oncology, immunology, infectious disease and cardiovascular disease - could generate more than US\$200 billion in M&A, with no megamergers required. Divesting deprioritized businesses such as animal health, women's health and consumer health could liberate tens of billions of additional M&A as well.

This modeling is based on 2017 revenues of companies with therapy area market shares of 3% or less, and excludes companies that are currently forecasted to exceed this revenue threshold in 2022. Deal multiples are conservative and calculated using median values of publicly disclosed transactions in the four therapeutic areas. (See Figure 7.)

When those deals will happen is an open question. If regulators (or payers) require greater use of outcomes-based pricing arrangements, for instance, that reimbursement shift would likely increase demand for real-world data, creating additional drivers for the creation of therapeutically focused, data-rich networks. Those changes could alter and further accelerate portfolio optimization similar to the way that new emissions standards led to new innovations in the auto industry.

Figure 10. 2019 biopharma dealmaking needs by company

More focused and less focused companies need to do deals, but the need is most acute for those biopharma companies with the largest growth gaps. Quadrant mapping demonstrates which deals should be high priorities based on therapy area focus and forecasted compound annual growth rate.



Sources: EY, Datamonitor Healthcare. Analysis is based on company biopharma revenues only, not total revenues.

Implications for 2019 biopharma dealmaking

Looking ahead, it's possible to sketch out the broad outlines of biopharma dealmaking at the company level using two different parameters: the degree of therapeutic focus associated with a company's marketed biopharma products; and a company's five-year projected compound annual growth rate. In order to make meaningful comparisons, this analysis does not account for further diversification into non-biopharma businesses. As such, it is based only on a company's biopharma revenues, not total sales. (See Figure 10.)

Applying these two metrics lets us map companies into four broad areas based on their dealmaking imperatives:

- ▶ **Companies with low focus and low growth prospects:** These companies face a total growth gap of more than US\$50 billion based on EY calculations. To close their gaps, companies in this quadrant need to divest non-core assets and add scale in therapeutic areas through bolt-on deals. This is the one group that might want to consider megamergers if large deals can provide therapeutic focus and cost synergies without adding too much complexity.
- ▶ **Companies with low focus and high growth prospects:** These companies should focus on divesting non-core assets and redeploying capital into their faster-growing businesses. Five-year CAGR forecasts look promising for these companies, though pipeline failures that dent these projections would increase the need for them to accelerate their M&A and partnering agendas.

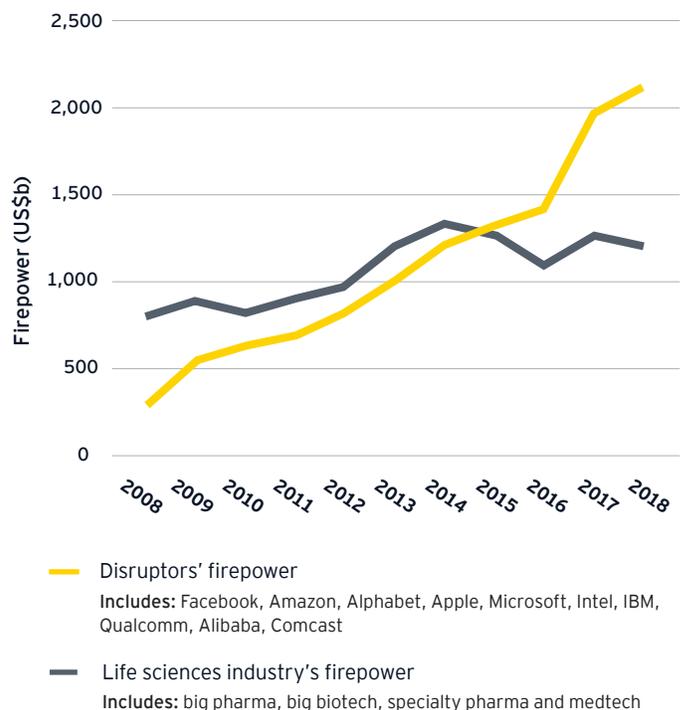
Consider AstraZeneca, where the growth of the oncology business, fueled by products such as Tagrisso and Lynparza, is offsetting the revenue decline of the company's larger cardiovascular and respiratory portfolios. In November 2018, AstraZeneca announced the sale of multiple deprioritized respiratory assets for US\$2 billion. That cash can now be repurposed to continue to solidify the oncology franchise.

Companies with low focus and high growth potential face some of the highest cultural hurdles to divesting deprioritized assets, largely because these mature products still generate significant near-term revenues. Investors may challenge a company's decision to divest such "cash cows" to redeploy the capital in higher growing but riskier assets. In addition to creating a strategy to optimize the portfolio, another key focus area for the management teams of these companies is to create the business case for why planned divestitures are able to unlock more value than continuing with the status quo.

- ▶ **Companies with high focus and low growth prospects:** Having identified therapeutic areas that are "must win," companies in this quadrant must further solidify their market positions with bolt-on acquisitions and digitally based partnerships. Gilead Sciences, for example, has built an industry-leading position in infectious diseases and has invested heavily in oncology. What its new management will do in oncology following the 2017 acquisition of Kite Pharma, remains an open question.
- ▶ **Companies with high focus and high growth prospects:** Companies in this quadrant have the luxury of investing for future growth (for example, via partnerships) without the urgent need to divest. They cannot, however, afford to do nothing: the potential disruption from new entrants leaves no room for complacency.

Figure 11. The rising firepower of disruptors relative to life sciences companies creates dealmaking urgency

Technology and consumer companies have the data analytics skills, the connected devices or the consumer relationships to potentially influence health care delivery. These 10 organizations have nearly US\$1 trillion more firepower to do deals than the entire life sciences industry combined.



Sources: EY, Capital IQ. Firepower analysis calculated through 31 October 2018.

Embracing the upside of transformation

In the near term, life sciences companies are most likely to use alliances to acquire growth capabilities for a number of reasons. The hard-to-quantify return on investment for innovative technologies may keep many companies on the sidelines; it also raises important questions about whether current valuation methodologies are outdated.

In addition, the risks of buying and integrating an innovative biotech or digital startup may be too high, especially if acquirers worry that it will be difficult to incentivize key talent to remain following a deal's closure. It is better in this case to structure an alliance that keeps the smaller company independent, able to innovate and its culture intact, but not resource constrained thanks to the financial support of the larger organization. Finally, any further slowdown in top-line growth resulting from macroeconomic factors (e.g., trade or pricing reforms) is likely to boost the importance of partnerships even more.

Given the high prices for late-stage assets, those partnerships may happen even earlier in the R&D life cycle, when assets are relatively more affordable. Companies may also want to prioritize minority investments, as GlaxoSmithKline has done with 23andMe, and as Roche and Celgene did with Foundation

Medicine and Juno, respectively. In the latter two instances, these equity stakes eventually led to full-scale acquisitions, providing a new model for staged acquisitions that might be useful to hedge scientific and capital risk.

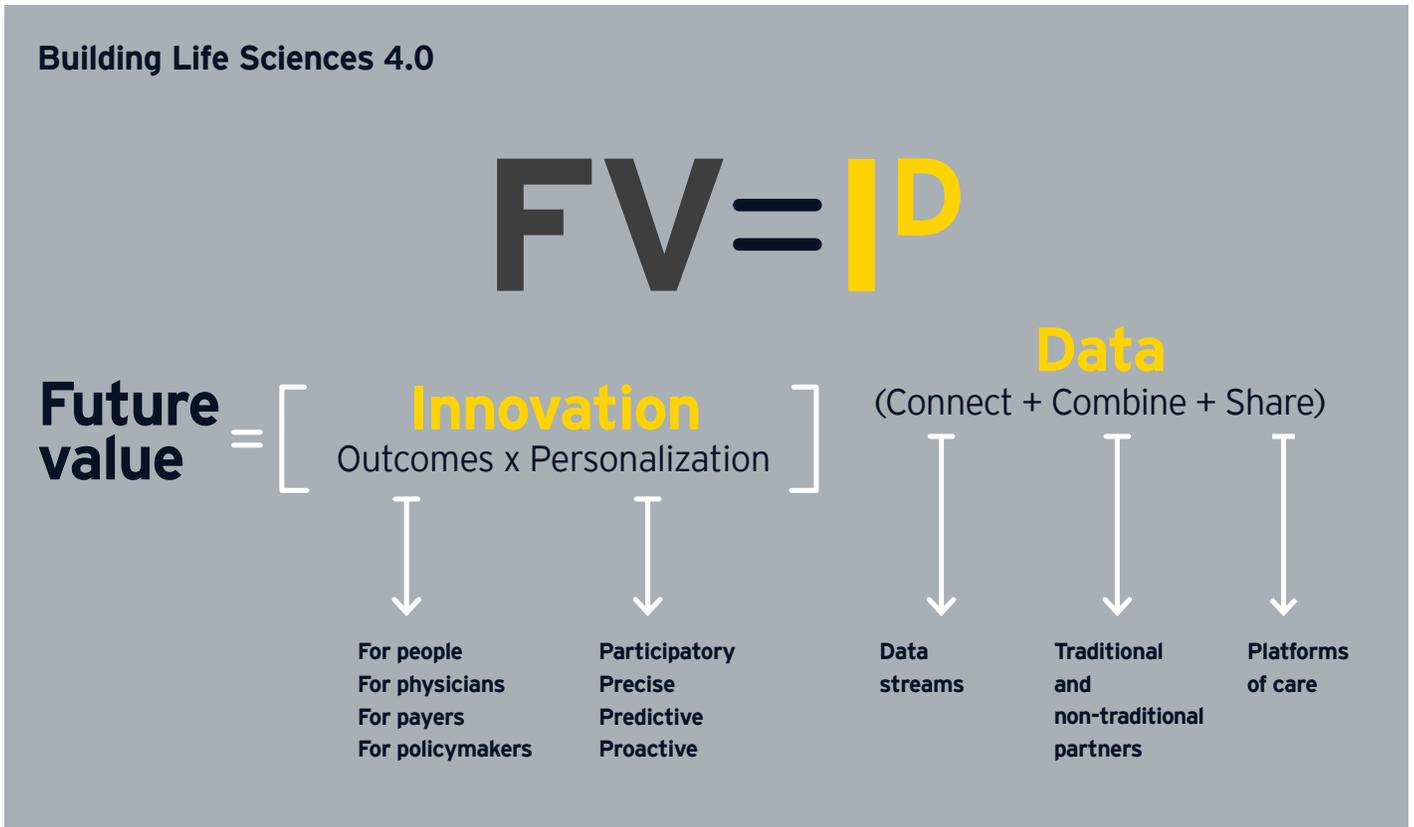
Whether they want to bring new technologies in-house or remain in partnering relationships, we believe companies must emphasize digital deals that align with their therapeutic focus. They will need to learn to connect, combine and share data quickly and at scale to create secure solutions that deliver clinical and economic benefits across the ecosystem. As shown in Figure 12, this future value (FV) for all stakeholders will come from innovations (I) powered by data (D) to deliver personalized health outcomes.

Above all, as companies develop their M&A and partnering strategies to build future value and counter the threat of new entrants, they must remain agile and move fast. As *Harvard Business Review's* classic 2002 study of patterns of consolidation across industries warned: "Slower firms eventually become acquisition targets and will likely disappear. Most companies won't survive to the endgame by trying to stay out of the contest, or worse, by ignoring it."³

³ Graeme Deans, Fritz Kroeger and Stefan Zeisel, "The Consolidation Curve," Zeisel et al., *Harvard Business Review*, December 2002.



Figure 12. A new equation for delivering value



Above all, as companies develop their M&A and partnering strategies to build future value and counter the threat of new entrants, they must remain agile and move fast.

Methodology

Dealmaking analysis

Life sciences M&A activity was analyzed from 1 January 2014 to 4 December 2018 using data from Capital IQ. Deals were categorized according to the acquirer's subsector (e.g., big biotech, big pharma, specialty pharma/generics and medical device and life sciences tools companies) and by rationale as follows:

- ▶ **Financial deal:** Characterization used when the acquirer is a financial buyer (e.g., private equity) outside the life sciences industry.
- ▶ **Asset swap:** Transaction in which the companies participate as both acquirers and sellers, negotiating the exchange of assets with each other.
- ▶ **Geographic expansion:** Acquisitions by a life sciences company specifically designed to access capabilities in a new geography. This does not include cross-border transactions that are part of larger, transformative transactions.
- ▶ **Transformative M&A/megamerger:** Deal meets one of two criteria: deal is greater than US\$10 billion in deal value or affects more than 50% of either company's market capitalization. Megamergers are a subset of transformative M&A with valuations of at least US\$40 billion.
- ▶ **Bolt-on:** Small- to medium-sized acquisitions that account for less than 25% of the buyer's market capitalization.

As part of the dealmaking analysis, EY researchers tracked the digital alliances and acquisitions signed by leading life sciences companies by therapeutic area, technology capability (e.g., sensors or artificial intelligence) and strategic purpose. Direct investments in digital health companies were excluded from this analysis.

Firepower and valuation analyses

Firepower is defined as a company's capacity to fund transactions based on its balance sheet. It has four key inputs: 1. Cash and equivalents; 2. Existing debt; 3. Debt capacity, including credit lines; and 4. Market capitalization. The following assumptions underpin the analysis:

- ▶ A company will not acquire targets that exceed 50% of its existing market capitalization.
- ▶ When a transaction results in a new company, the debt-to-equity ratio of the combined entity cannot exceed 30%.
- ▶ Equity is measured on a market value basis.
- ▶ The methodology does not calculate the ability to perform M&A via stock-for-stock transactions. However, increases in a company's stock price do increase a company's firepower because increased equity enables companies to borrow more to finance transactions.

EY teams measure "firepower" trends across the big pharma, big biotech, medtech and specialty pharma/generics subsectors, as well as a subset of technology and consumer companies. This year's EY Firepower Index includes 74 life sciences companies. While some life sciences companies have made acquisitions that extend beyond the upper threshold defined in the firepower methodology, the goal is to create a uniform approach to measure relative changes in firepower.

Unless otherwise noted, 31 December data were used to calculate annual firepower results; for 2018, results were analyzed through 31 October. In instances where transactions by companies in two different subsectors took place (e.g., Takeda's acquisition of Shire), firepower calculations were performed for the separate entities until closure of the transaction.

To assess the ability of biopharma and medtech buyers to acquire potential growth targets, EY researchers compared the market valuations of a select group of publicly traded medical device, biotech and digital health companies as of 31 October 2018 to the average firepower of biopharma and medtech buyers. The biotech and medtech companies ranged in market valuations from US\$500 million to US\$30 billion; Rock Health's Digital Health Public Health Company Index was used to benchmark digital health valuations.

Biotech acquisition targets included in the analysis were ACADIA Pharmaceuticals Inc., Acceleron Pharma Inc., Aimmune Therapeutics Inc., Alkermes PLC, Alnylam Pharmaceuticals Inc., Amarin Corporation PLC, AnaptysBio Inc., Audentes Therapeutics Inc., BioMarin Pharmaceutical Inc., Bluebird Bio Inc., Clovis Oncology Inc., Esperion Therapeutics Inc., Galapagos NV, Heron Therapeutics Inc., Incyte Corp., Intercept Pharmaceuticals Inc., Ionis Pharmaceuticals Inc., Loxo Oncology Inc., Neurocrine Biosciences Inc., Nektar Therapeutics, Sage Therapeutics, Inc., Sarepta Therapeutics Inc., Seattle Genetics Inc., Tesaro Inc. and Ultragenyx Pharmaceutical Inc.

The life sciences companies included in the 2019 EY Firepower Index are:

Big pharma

AbbVie Inc.
Astellas Pharma
AstraZeneca PLC
Bayer AG
Bristol-Myers Squibb Co.
Daiichi Sankyo Co. Ltd.
Eisai Co. Ltd.
Eli Lilly and Company
GlaxoSmithKline PLC
Johnson & Johnson
Merck & Co. Inc.
Novartis AG
Pfizer Inc.
Roche Holding AG
Sanofi
Takeda Pharmaceutical Company Ltd.

Big biotech

Alexion Pharmaceuticals Inc.
Amgen Inc.
Biogen Inc.
BioMarin Pharmaceutical Inc.
Celgene Corp.
Gilead Sciences Inc.
Incyte Corp.
Novo Nordisk A/S
Regeneron Pharmaceuticals Inc.
Seattle Genetics Inc.
Vertex Pharmaceuticals Inc.

Medtech acquisition targets included in the analysis were AngioDynamics, Inc., AtriCure Inc., AxoGen Inc., Bio-Rad Laboratories Inc., ConvaTec Group PLC, Glaukos Corp., Haemonetics Corp., Inspire Medical Systems Inc., Insulet Corp., Integra LifeSciences Holdings Corp., Intersect ENT Inc., iRhythm Technologies Inc., LivaNova PLC, Masimo Corp., Nevro Corp., NuVasive Inc., Orthofix Medical Inc., Penumbra Inc., QIAGEN NV, Quidel Corp., STERIS PLC, Tandem Diabetes Care Inc., TransEnterix Inc., Varian Medical Systems Inc. and Wright Medical Group NV.

Performance analysis of biopharma incumbents

The pharmaceutical portfolios of 25 biopharma incumbents were categorized as more focused or less focused based on the following criterion: companies that generated at least 50% of their biopharmaceutical revenues from one therapeutic area according to Datamonitor Healthcare were classified as more focused; companies that didn't meet this threshold were less focused.

The financial and operational performance of the more focused (n=10) and less focused (n=15) cohorts were analyzed across six metrics: EBITDA margin (five-year average); five-year compound annual growth rate; return on invested capital (five-year average); five-year total shareholder return; average valuation; and average growth gap.

The **growth gap** is the difference in the sales growth of a biopharma company relative to overall drug market sales. It is based on IQVIA's global drug market forecast and Datamonitor Healthcare's estimates of company sales. For the purpose of this analysis, only aggregate growth gaps for more focused and less focused groups were reported.

To understand the dealmaking implications for more focused and less focused biopharma companies, EY researchers segregated the two cohorts based on the forecasted five-year compound annual growth rates of biopharma products from 2018-2022. Unless otherwise noted, Datamonitor Healthcare's estimated drug forecasts were used as the source for all sales figures.

Industry fragmentation and portfolio optimization

To understand how consolidation in therapeutic areas might drive future dealmaking, EY researchers calculated the percentage of the total biopharma market captured by the top drugmakers in 2017. Data for total market size were supplied by IQVIA. Datamonitor Healthcare estimates were used to determine company revenues and market sizes for individual therapeutic areas. The revenues of Johnson & Johnson and Takeda Pharmaceutical Company include revenues from respective acquisitions, Actelion and Shire.

To model the potential M&A activity that could result from portfolio optimization, EY first analyzed the market fragmentation in four therapeutic areas: oncology, immunology and inflammation, cardiovascular disease and infectious disease. The analysis is based on the following assumptions:

- ▶ Assets were presumed to be candidates for portfolio optimization if company revenues in this therapy area totaled 3% or less of the total therapy area revenues based on 2022 Datamonitor Healthcare forecasts.
- ▶ To determine potential revenue multiples in each of the four therapeutic areas, precedent transactions since January 2015 were used to calculate average and median revenue multiples. To avoid skewing the results, the following types of transactions were excluded from this analysis: deals involving less than a 50% ownership stake; deals with enterprise value to revenue ratios of more than 25-fold.
- ▶ To establish the base case for deal values in each therapeutic area, median revenue multiples were rounded down to the lower whole number. For example, the median multiple for oncology assets was calculated to be 5.4, resulting in the 5x multiple used to assess the potential aggregate value of all oncology assets that might be divestiture candidates.

Specialty pharma/generics

Alkermes PLC
Allergan PLC
Bausch Health Companies Inc.
Endo International PLC
Indivior PLC
Jazz Pharmaceuticals PLC
Mallinckrodt Public Limited Company
Merck KGaA, Darmstadt, Germany
Mylan NV
Perrigo Company PLC
Shire PLC
Teva Pharmaceutical Industries Ltd.
UCB SA

Medical device and life sciences tools companies

Abbott Laboratories
Baxter International Inc.
BD
bioMerieux SA
Bio-Rad Laboratories Inc.
Boston Scientific Corp.
Bruker Corp.
DexCom, Inc.
DiaSorin
Edwards Lifesciences Corp.
Genomic Health Inc.
Haemonetics Corp.
Hill-Rom Holdings Inc.
Hologic Inc.
Illumina Inc.
Integra LifeSciences Holdings Corp.
Intuitive Surgical Inc.
Medtronic PLC
Myriad Genetics, Inc.
OPKO Health Inc.
OraSure Technologies, Inc.
PerkinElmer Inc.
QIAGEN N.V.
Quidel Corp.
Smith & Nephew PLC
Sonic Healthcare Ltd.
Stryker Corp.
Sysmex Corp.
Teleflex Inc.
Thermo Fisher Scientific Inc.
Varian Medical Systems, Inc.
Veracyte Inc.
Waters Corp.
Zimmer Biomet Holdings, Inc.

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Focusing on fewer therapeutic areas is a necessary first step to creating agile, more competitive businesses and building deeper relationships with key health stakeholders.

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How EY's Global Life Sciences Sector can help your business

As populations age and chronic diseases become commonplace, health care will take an ever larger share of GDP. Scientific progress, augmented intelligence and a more empowered patient are driving changes in the delivery of health care to a personalized experience that demands health outcomes as the core metric. This is causing a power shift among traditional stakeholder groups, with new entrants (often not driven by profit) disrupting incumbents. Innovation, productivity and access to patients remain the industry's biggest challenges. These trends challenge the capital strategy of every link in the life sciences value chain, from R&D and product supply to product launch and patient-centric operating models.

Our Global Life Sciences Sector brings together a worldwide network of 17,000 sector-focused professionals to anticipate trends, identify their implications and help our clients create competitive advantage. We can help you navigate your way forward and achieve sustainable success in the new health-outcomes-driven ecosystem.

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