Life Sciences 4.0: transforming health care in India

How can you capture future value in a disruptive ecosystem
What is the Fourth Industrial Revolution and why is it important for the Indian health care ecosystem?

We are entering the Fourth Industrial Revolution (Industry 4.0) where rapid technological advances are blurring the boundaries between the physical, digital and biological worlds. Health care delivery is now being reimagined globally as a result of scientific and technological advancements and rising customer expectations.

Life Sciences 4.0 (LS 4.0) has the potential to revolutionize health care in India by providing a solution for the ever-widening health care demand vs. supply gap, while still maintaining affordability.

The future value of many global life sciences companies is increasingly linked to their ability to unlock the power of data through platforms. These global trends find resonance in India as well.

The Government of India has already embarked on its digital enablement journey with several initiatives. India is also witnessing a burgeoning start-up ecosystem that is bringing into life a whole new world of innovation in the country. These new entrants are challenging the traditional ways of doing business in all walks of life, including health care.

Why should Indian life sciences companies embrace 4.0?

Embracing Life Sciences 4.0 can help life sciences companies gain competitive advantage by redesigning the entire product value chain into a more robust, transparent and cost efficient system.

Generic drug manufacturers can leverage new technologies such as robotics process automation (RPA), artificial intelligence (AI), blockchain, etc. to build more efficient, integrated, automated and compliant manufacturing and supply chain systems that meet global quality and regulatory requirements.

Biosimilars and specialist drug producers can leverage new technologies to bring more efficiencies in the R&D function, starting from drug discovery to conducting clinical trials. Marketers of drugs for chronic diseases can differentiate themselves by providing customized solutions for patients to enable more effective disease diagnosis, treatment, and management. With the increasing health awareness in the Indian population, we are witnessing a new breed of companies –Lifestyle managers – that go far beyond disease and focus on prevention. These companies can leverage new technologies and behavioral science to launch personalized solutions that make people want to stay involved in their own care.

Life sciences companies have taken the first steps of their 4.0 journey and the future is bright.

The Fourth Industrial Revolution brings tremendous potential for India to leapfrog many stages of development. India can finally bring together its traditional strengths in IT and Pharma and script the next chapter in global health care.

This paper tries to examine some of the implications of LS 4.0, what are many Indian life sciences companies doing and who are the emerging players in this space.

“National Health Policy”, MHW, Government of India, 2017
BioAsia Foreword

In recent years, the rapid application of digital and other technological advances to life sciences and healthcare has led to exciting new applications. Traditional business practices are being challenged by the new entrants. Telangana, with its capabilities in both life sciences and technology sector, is at a unique cusp to leverage this digital medicine opportunity. It is in this context, the Government of Telangana has partnered with EY to organize the 16th edition of its flagship international convention - BioAsia, from 25-27 February 2019, with the theme of “Life Sciences 4.0 – Disrupt the Disruption” focused on re-imagining healthcare.

BioAsia has evolved over the years as a preeminent global meeting for researchers, academia, industry and policy makers to discuss collaborative opportunities. This year too, BioAsia will bring together a galaxy of established industrial and scientific leaders at the conference. The event is seen widely as a catalyst for the life sciences industry, providing a platform for B2B meetings, advocating policies and discussing the road map for the industry. In our efforts to capture the global and domestic trends in the industry, the thought leadership report has been prepared by EY and will be launched during BioAsia.
Life Sciences 4.0: transforming health care in India
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How is technology disrupting the health care ecosystem in India – thoughts from the industry leaders

“Emerging technological innovations are changing the way health care is delivered around the world and in India. With vital health information available at fingertips, patients today are much more empowered to make informed choices and participate in shared decision-making with their treating physicians. Data mining has enabled health systems and clinicians to generate real-world evidence and to ensure better clinical outcomes. Wearables, digital apps and m-health programs are helping in early detection, real-time patient tracking and treatment adherence among patients. Simply put, technology is creating exciting new opportunities for life sciences companies and the entire health care industry to innovate and redefine the existing health care ecosystem.”
“Technology is disrupting the health care ecosystem in India in many ways. New medical devices and point of care diagnostic solutions are significantly improving affordability and accessibility challenges. Teleconsulting, remote monitoring systems and point of care diagnostics will help to deliver quality health care to even remote parts of India.

Tools and devices based on new technologies such as artificial intelligence (AI), machine learning (ML), Internet of Things (IoT) and radio frequency identification (RFID) will help in improving clinical outcomes. Interpretation of radiology reports using AI will help reduce errors. Usage of IoT based “continuous vital monitoring system such as VIOS” will bring Intensive Care Unit–standard monitoring across general wards, thus reducing cost for the patients while providing quality health care. Systems built on RFID technology will help in tracking patients in emergency and improve time to provide care (e.g., door-to-needle, door-to-balloon, etc.).

Patient experience can be impacted through tools such as doctor appointment system, e-prescription, self-service kiosks, bed side admission/ discharge technologies.

Another important dimension of technology disruption in the area of scientific research and innovation is precision medicine - cheaper and faster genome sequencing and gene editing are some examples.

Hospitals can create win-win partnerships with key technology partners to develop, implement and adopt innovations while keeping a tight vigil on cost of care and efficiencies.”

“Health care in India operates under immense pressure - I see technology as a way to ease this burden. From the use of augmented reality in skilling, to robotics, to the use of AI in documentation and SOPs - I believe the seeds for better patient outcomes, a more industry-friendly regulatory environment and higher quality standards have been sown.

The outlook for Indian life sciences companies is bright indeed. While opportunities abound, we need to leverage this disruption and keep innovating to retain our competitive edge and stay relevant to the growing demands of the health care space. I look forward to our industry seizing the upside of disruption and scaling new heights of complexity, quality and affordability.”
Chapter 1

How is the Fourth Industrial Revolution redefining health care globally?

The Fourth industrial revolution is blurring boundaries between industries, resulting in a hyper-connected world.

Technological advancements are redefining products and enabling customization of services across all industries, including health care.

As the ecosystem evolves, life sciences companies must change their business models and personalize their products and services.
In the wake of the Fourth Industrial Revolution, life sciences companies will create value by combining different data to personalize outcomes.

Future value (FV) is driven by innovation (I) that focuses on outcomes with a high degree of personalization and is fuelled by unlocking the power of data (D).

\[ FV = I \times D \]

**Future Value**

**Innovation**

Outcomes \( \times \) Personalization

**Data**

(Connect + Combine + Share)

We are entering the Fourth Industrial Revolution where rapid technological advances are blurring the boundaries between the physical, digital and biological worlds.

New technologies (e.g., robotics, blockchain, 3D printing and artificial intelligence) and scientific breakthroughs such as gene editing (Figure 1) have resulted in a hyper-connected world and the transformation of life sciences companies’ business models.

As consumers grow accustomed to sharing data and using it in real time to do their banking or retail, these experiences color their expectations of what kind of health care they deserve. As a result, there has been a radical shift in consumer expectations and awareness about the desire for convenient, personalized care that improves an individual's health. The industry is working hand-in-hand with leading technology players to come up to speed and to further advance the technologies to newer and more sophisticated avenues.

Figure 1: Advances in technology create new opportunities to generate and use data to improve health outcomes

The pace of change is only accelerating and the future is only brighter.
For the last two decades life sciences companies have created value by developing premium priced products (either for primary care market or in more specialized areas such as oncology.) As reimbursement pressures have grown, there has been a shift toward outcomes driven business models. A multitude of technologies are reshaping this emerging health care ecosystem, including:

- **Electronic health records and cloud storage**: Allow quick access to and storage of individual's data enabling streamlined collaboration between different stakeholders in the ecosystem.
- **Consumer-facing mobile apps**: Empower patients to be in charge of their own health.
- **Wearables / Remote monitoring tools**: Enable care providers to remotely monitor the key health parameters of the patient and allow real-time decision making.
- **Augmented Reality**: Technologies such as 3D medical imaging and vein visualization are being explored to further improve remote care and achieve improved patient outcomes.

With this uninterrupted pace of technological evolution, we can soon expect an era of platforms providing end-to-end “medical solutions” by the end of the next decade.

New entrants outside the traditional health space see a massive opportunity to improve health care as a result of changing customer expectations and technological advancements. Convergence between these non-traditional and traditional players, which blends health care expertise with network and platform capabilities, is resulting in a new health care ecosystem that ultimately will be more holistic.

Ubiquity of mobile is resulting in the new generation of more informed patients. Not only are the patients more aware, but they are now also empowered to take a bigger role in their own care. This is transforming “sick care” to “health care” and “health care” to “participatory health care”.

Life sciences companies have already started to respond to this new demand-driven environment by redesigning their business models and focussing on patient centricity.

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**Figure 2: Life Sciences 4.0: Technological and scientific advancements are redefining the health care landscape**

**What’s now**

- Prayers, consumers and new entrants have the power
- Connected devices allow continuous disease management
- Drugs and medical devices are the highest-value products
- Value is captured by owing to all the data
- Health ecosystem is static and well-defined

**What’s next**

- Super consumers demand convenient, seamless care
- New technologies allow “pre-disease” identification and treatment
- Data algorithms are highest-value products
- Value is captured by sharing the data with ecosystem stakeholders
- Health ecosystem is a dynamic network
As life sciences companies strive to become pharma-tech organizations, they are investing heavily in new capabilities via digital partnerships and exploratory programs of their own.

Some of the top global pharma and medtech companies aim to transform into “medicine and technology” companies... however, these global giants acknowledge that this is not a smooth journey and there is still a long way to go.

Figure 3: Digital deals by top global biopharma (20 companies) and Medtech companies (21 companies)

347 digital deals signed by lifesciences incumbents between 1 January 2014 to 16 November 2018

50% of the digital deals were driven by the need to improve disease management and R&D efficiency

40% of biopharma digital deals were in oncology, central nervous system disorders and diabetes

Question to consider

How can life sciences companies deliver sustainable growth in a changing market environment that demands more customer-centric products and services?

*Digital deals from 2014 onwards were screened from various public domain sources. Deals include mergers and acquisitions, joint ventures or alliances and exclude PE/VC funding. Deal value for each year is a sum total of the disclosed values of all digital deals captured in that year.
Chapter 2

Why should the Indian health care sector embrace the Fourth Industrial Revolution?

The Indian health care system is being reshaped by three forces: increasing health care demand, technological ubiquity and rising patient awareness.

LS 4.0 has the potential to bridge the gap between health care supply and demand by increasing accessibility and affordability.

Health care stakeholders have started adopting new technologies and tools to deliver improved outcomes and experiences to their customers.
Three key forces – increasing health care demand, technological ubiquity and rising patient awareness – are challenging and redefining the health care ecosystem in India

Rising demand in health care and limited infrastructure

The Indian health care system lacks sufficient infrastructure to meet the health care demands of the country. It is currently facing two major burdens: the rising prevalence of lifestyle-related diseases and an aging population. As per India Brand Equity Foundation (IBEF) estimates, the respective ten-year CAGR (Compound annual growth rate) of hospitalized cases from 2008 till 2018 for cardiac diseases, oncology and diabetes are 18%, 16% and 19%. These factors, along with a rising population, are all leading to rising demand of specialized health care in India.

Looking at the current health care trends and an increasing need for specialized care, the challenges pertaining to health care infrastructure in the country are further expected to escalate. It is expected that India will require 2.07 million more doctors by 2030 in order to achieve a doctor-to-population ratio of 1:1,000 and an additional three million beds to achieve the target of three beds per 1,000 people by 2025. Lack of sufficient health care infrastructure has led to a supply-demand imbalance in the country making health care less affordable and accessible for all.

Increasing healthcare demand

Noncommunicable diseases account for 7 out of top 10 causes of deaths in India

Aged population (above 60 years) to rise from ~8% currently to ~19% by 2050

Limited healthcare infrastructure

Physician and nurse availability 30% and 50% below WHO recommendation respectively

Number of hospital beds 70% below WHO recommendation

~70% of the population lives in rural areas with access to less than ~30% of the healthcare infrastructure

While the steep imbalance between the demand for health care and the infrastructure available to support it poses huge challenges, the other two forces - technological ubiquity and rising patient awareness - have the potential to offer realistic solutions that can address affordability and accessibility.
In 2019, India has an opportunity to adopt technologies of the Fourth Industrial Revolution to deliver, at scale, improved outcomes to its people.

Digital technologies hold the potential to improve quality, affordability and accessibility of health care solutions, thus reshaping health care delivery across the patient pathway.

The Indian health care industry has already started showing early signs of disruption. As LS 4.0 is embraced by all health care stakeholders, it is critical that life sciences companies get ready to lead the change.

### Early signs of digital disruption

<table>
<thead>
<tr>
<th>Health care stakeholders</th>
<th>Case studies</th>
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<tbody>
<tr>
<td><strong>Hospitals</strong></td>
<td>A top Indian hospital’s telemedicine center achieved 85% reduction in the number of patients that had to be transported to the hospital</td>
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<tr>
<td><strong>Telemedicine</strong></td>
<td>60% of the doctors in India preferred digital vs. traditional face-to-face interactions with their patients one out of three times</td>
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<td><strong>Hospital management information systems</strong></td>
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<td><strong>Physicians</strong></td>
<td>Some of the big insurers in India are incentivising healthy behaviors by giving reward points up to 10% to 30% of annual premium</td>
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<tr>
<td><strong>Focus on health and wellness</strong></td>
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<tr>
<td><strong>Artificial Intelligence</strong></td>
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<td><strong>Online consultation</strong></td>
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<td><strong>Insurance companies</strong></td>
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<tr>
<td><strong>Digital portals /tools to improve customer support / sales</strong></td>
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<tr>
<td><strong>Life sciences companies</strong></td>
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<tr>
<td><strong>Technology for bringing efficiency</strong></td>
<td>47% of top pharma companies in India are providing tools for clinical decision support (for physicians) and 33% for virtual caregiving (for patients)</td>
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<tr>
<td><strong>Initiatives to improve customer engagement</strong></td>
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<tr>
<td><strong>Government</strong></td>
<td>Launch of mobile app based programs to educate rural nurses, including interactive symptom screening algorithms (based on WHO guidelines)</td>
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<tr>
<td><strong>Mobile-based health delivery</strong></td>
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<td><strong>Awareness apps and websites</strong></td>
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### Question to consider

How can life sciences companies strengthen their position as key health technology providers in a wider ecosystem?

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Chapter 3

How will platforms help life sciences companies create future value?

Four business models describe Indian life sciences companies: efficient producer, breakthrough innovator, disease manager and lifestyle manager.

Companies are beginning to invest in digital capabilities, but initial efforts are largely ad hoc and experimental.

To capture future value, all companies, regardless of their business model, need to invest in platform capabilities.
As the Indian health care industry has started responding to the changing environment, the life sciences industry also needs to speed up its activity in the area.

Companies have started taking small, experimental steps on their 4.0 journey. Most of the current efforts are directed toward enhancing customer engagement by providing wrap-around services for key products. Some companies are also making headway toward achieving operational efficiency in their R&D, manufacturing, supply chain and marketing business functions. Below are some of the key areas where Indian life sciences companies have started adopting digital technologies:

- **Patient engagement:** Tools / services for increasing patient awareness about disease / health, inducing behavioral changes, encouraging medication adherence, enabling self-management; digital campaigns (including multichannel marketing)
- **Physician engagement:** Tools / services for sharing educational material; interactive portals to connect, learn and share with peer fraternity; tools / data to enable informed decision making
- **Field force effectiveness:** Technology interfaces such as tabs for e-detailing and easy day-to-day reporting; smart mobile apps for appointment bookings and work day planning; mobile learning solutions
- **R&D efficiency:** Clinical trial data management solutions to improve clinical trial efficiency; technology and data to improve R&D productivity / efficiency
- **Supply chain management:** Use of software to streamline supply and demand and connect buyers to sellers quickly; serialization

A leading pharma player’s shift in digital ambition and rising use of technology*

*The figure captures only a few examples and is not an exhaustive list

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Platforms that utilize information from different stages of the patient journey to inform other stages could create meaningful value, predicts CEO of one of the top 10 global medtech companies. He’s seen their benefit in the hotel and leisure industry, where platforms specifically aimed at eliminating frictions in the travel experience have allowed host of new vacation rental companies to take market share from traditional hotel and vacation incumbents.

While Indian pharma players are making multiple investments, the activity is fragmented across the value chain. As such, the efforts don’t go far enough to fully leverage the potential benefits of the new technologies and the abundance of data now available. The pharma industry is in urgent need of holistic platforms that connect the entire product value chain, with patients being an integral part of the process. These connected platforms can help pharma companies deliver the desired outcomes to all stakeholders, while also capturing value for themselves in the form of access to useful data and trusted relationships. Chapter 5 of this report will have more information on this topic.
A majority of the Indian life sciences companies can be categorized into the following four broad business models:

- **Efficient producer**: Developer of generics or low-cost products that perform as well as the competition.
- **Breakthrough innovator**: Developer of best-in-class products that command high prices.
- **Disease manager**: Developer of products and solutions to manage chronic conditions end-to-end.
- **Lifestyle manager**: Developer of products aimed at prevention and overall health maintenance, mostly sold directly to the consumer.

Figure 4: Optimal value will come when life sciences companies create products and services to match demands from different customer segments.

As companies respond to evolving customer demands, how these companies create value in the future and the capabilities they need will shift in ways that depend on their chosen business models, for instance:

- **Efficient producers** will create value by delivering high quality drugs at low cost. They will need capabilities\(^*\) (e.g., predictive analytics, blockchain, automation, etc.) that bring efficiency and transparency to their manufacturing and supply chains.

- **Breakthrough innovators** will create value by launching innovative drugs and potentially services, to cure diseases. They will need capabilities (e.g., artificial intelligence, remote monitoring systems, etc.) to improve efficiency in drug discovery and the clinical trial process, and also to generate real world data to demonstrate improved outcomes.

- **Disease managers** will create value by combining medicines with services that help patients manage chronic disease, and help providers deliver better care. They need to develop systems to gain a personalized understanding of patient behaviors and thereby provide customized solutions that improve drug adherence and the patient experience.

- **Lifestyle managers** go beyond disease. These companies will create value by helping consumers prevent diseases in the first place. Like Disease managers, they will need to develop capabilities to drive behavior change. A key differentiator will be the ability to keep consumers engaged by using algorithms to anticipate their needs and provide the required solutions proactively.

\(^*\)Technology and talent resources

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**Figure 5: Platforms of care can create new opportunities for value creation across all business models**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Efficient producers</th>
<th>Disease managers</th>
<th>Breakthrough innovators</th>
<th>Lifestyle managers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Competitive advantage</strong></td>
<td>Leverage innovator to create post-patent copies</td>
<td>End-to-end management of chronic disease</td>
<td>Develop novel products with pricing flexibility</td>
<td>Prevent disease and maintain health status</td>
</tr>
<tr>
<td>Lowest cost operator</td>
<td>Creation of seamless customer experience</td>
<td>Therapeutic area leadership</td>
<td>Deep customer engagement</td>
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<tr>
<td>Ability to scale</td>
<td>Incentives to drive platform use</td>
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<td>Fast-follower execution</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Value creation</th>
<th>Focus on volume</th>
<th>Performance-based payment models</th>
<th>Real-world value</th>
<th>Novel payment models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-cost, automated delivery platforms</td>
<td>Simple, robust connected devices/ platforms</td>
<td>Digital tools improve patient recruitment/monitoring</td>
<td>Digital marketing to customers' needs</td>
<td></td>
</tr>
<tr>
<td>Customized ordering/ payment services</td>
<td>Customized services using behavioural and other data</td>
<td>Personalized or individualized treatment solutions</td>
<td>Tailored lifestyle/health solutions</td>
<td></td>
</tr>
<tr>
<td>Supply chain and manufacturing analytics</td>
<td>Care algorithms from real-world and clinical data</td>
<td>Real-world data to validate innovations</td>
<td>Analytics maximize consumers' health status</td>
<td></td>
</tr>
</tbody>
</table>

Generic drugs form the largest segment of the Indian pharmaceutical sector holding 70% of the market share by revenue in 2017. India is also the world’s largest provider of generic medicines, with 20% of all global generics (in terms of market value) in 2018 coming from India. The US is the biggest generics’ export destination for India, which supplies approximately 40% of the US’s generic drug needs.

The generics industry continues to hold potential for growth globally owing to:

- Looming patent expiries
- Increasing push from regulatory bodies of several countries, including India, to increase uptake of generics to reduce health care costs

The industry is also expected to expand in India in the wake of Indian government’s Ayushman Bharat initiative. This initiative, which was launched in August 2018, aims at covering the primary, secondary and tertiary health care needs of the population in an affordable manner. It is expected to benefit 100 million poor families in the country.

As we see these multiple opportunities for growth, there are also several challenges. On one side increasing pricing pressure is opening the market for generics and on the other side it is resulting in the following challenges for the generic drug makers:

US generics pricing continues to be on a deflationary trajectory (~6.4% deflation across all national drug codes on y-o-y basis in April 2018)

Increasing competition in an already crowded market (3x increase in new players receiving their first Abbreviated New Drug Application (ANDA) approval in last five years – 11 players in 2013 vs. 32 in 2017)

Providers in the US continue to identify new ways to reduce costs. For instance, in 2018, several major hospitals formed their own not-for-profit generic drug company, Civica Rx, to tackle chronic shortages and high prices. Within three to five years, Civica aims to offer up to 100 generics critical to everyday functioning of its member hospitals

In order to retain its market share in the global generics industry, Indian pharma companies need to focus on providing greater value at a lower cost while meeting quality and regulatory mandates. Companies can achieve this by adopting technological solutions for streamlining their manufacturing and supply chain capabilities. In addition, companies can also increase market opportunities by moving up the value chain and focussing on complex generics, added value generics and biosimilars.

Breakthrough innovators

Several Indian pharma companies are gradually stepping up the value chain and transforming into innovative drug producers. The average R&D spend of top Indian pharma companies has increased from 5.9% of sales in FY2011 to ~8.8% during FY2018.

As these companies keep moving forward toward discovering and developing innovative products, it is of utmost importance for them to embrace digital. In addition to having access to emerging science, these companies need to establish platforms that collect and integrate real world data into ongoing R&D programs. They also need to streamline the entire R&D process, including drug development and clinical trials to achieve higher efficiency and greater transparency.

R&D expenditure for top Indian domestic pharma (INR m)

<table>
<thead>
<tr>
<th>Company</th>
<th>FY10</th>
<th>FY18</th>
<th>R&amp;D spend as a percentage of revenue from operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun Pharma</td>
<td>22,489</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Lupin</td>
<td>18,510</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Dr. Reddy’s Lab</td>
<td>18,265</td>
<td>13%</td>
<td></td>
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<tr>
<td>Cipla</td>
<td>10,740</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Zydus Cadila</td>
<td>6,900</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Aurobindo Pharma</td>
<td>6,665</td>
<td>3%</td>
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<tr>
<td>Torrent</td>
<td>3,693</td>
<td>6%</td>
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</tbody>
</table>

Key focus areas

- **Speciality products and complex generics**
- **Speciality products, complex generics and biosimilars**
- **Speciality products, complex generics and biosimilars**
- **Speciality and respiratory medicine**
- **NMEs, biologics, vaccines and new technologies**
- **Complex products and drug delivery systems**
- **NCEs, new processes for known APIs and formulations**

Source: Company Annual Reports, EY Analysis

Breakthrough innovators must build platform capabilities to bring efficiency in their drug development and clinical trial process, and also to capture real world data.

**Disease managers**

The current focus of Indian pharma industry is manufacturing drugs to treat ailing patients. However, with an increasing number of people suffering from chronic and lifestyle-related diseases such as diabetes, hypertension and obesity, the country is now witnessing a shift in focus from treating disease to preventing its onset.

Apart from limited affordability, lack of awareness and limited patient adherence are the key factors contributing toward poor management of chronic diseases in India. Disease managers aim to create holistic personalized offerings that help patients manage their illnesses. Disease management companies thus need to focus essentially on the customer-centric aspect of the value chain, which is commercialization and product uptake by the patients. They need to equip patients with tools that improve drug adherence and the overall customer experience. The end result will be simple yet robust platforms that can engage and empower patients. The data originating from these platforms will also enable physicians to optimize patient care.

A comprehensive personalized disease management program by a global pharma major

<table>
<thead>
<tr>
<th>Diabetes myths and facts</th>
<th>Diabetes 101: information about type 1 and type 2 diabetes</th>
<th>Why diabetes changes? Why medication changes</th>
<th>Which numbers to watch and where you stand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get the facts</td>
<td></td>
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<tr>
<td>Get a plan</td>
<td>Eat right (GoMeals app), maintain fitness, keep scores, achieve goals</td>
<td>Blood sugar tracker to track diabetes</td>
<td>Starting and staying on medicines</td>
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<td></td>
<td></td>
<td></td>
<td>Living with diabetes</td>
</tr>
<tr>
<td>Get help</td>
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<tr>
<td>Diabetes specialists and Coaches / Champions: share experiences, advice, encourage</td>
<td>Have loved ones as part of Diabetes Care Team</td>
<td>On Social</td>
<td>Helpful resources</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td>Diabetes websites (e.g. ADA) for people with diabetes and for their loved ones, friends, and care partners</td>
</tr>
<tr>
<td>resources</td>
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**Disease managers must build platform capabilities that help them in understanding personalized customer behaviors and thereby establish high-touch, high-information relationship**
Lifestyle managers

Chronic diseases have emerged as the leading causes of death in India, accounting for about seven out of ten deaths in the country. The burden of chronic diseases is predicted to continue to escalate due to the changing lifestyle and behaviour patterns in the country. As stated by the World Obesity Foundation, about three out of ten Indians are expected to be obese by 2025 (~48.3 million Indians). 16

Because of the current situation, the Indian population is becoming more aware of the need to maintain a healthy lifestyle. This is leading to an increasing need for lifestyle managers in the country.

“An ounce of prevention is worth a pound of cure” is the new reality in value based healthcare

Wellness benefits are now in insurance plans

There is emergence of new niche categories such as anti-aging, skin care, digestive care

51% of internet users access health related online

Online retail is expected to grow at 1200% to US$200b in 2026 vs. US$15b in 2016

Gym, yoga centers and health clubs are set to witness a growth at 18% CAGR (2015-2020)

Nutritional care providers (dietician and nutritionist) are expected to increase at 12% CAGR (2015-2020)

Sensing the opportunity, FMCG companies and digital health start-ups are already moving aggressively to meet shifting needs of the consumers:

- Start-ups are coming up with new personalized digital solutions for prevention and management of chronic diseases, and maintaining healthy lifestyle
- FMCG companies are launching a whole new line of “Smart” and “Healthy” food products

Because Pharma companies understand the health care industry better than new or non-traditional organizations, they have an exciting opportunity to lead in this new space and deliver improved outcomes to consumers.

Lifestyle managers must build platform capabilities that help them in understanding personalized customer behaviors and deliver easy-to-use solutions that make people want to stay involved in their care
Evolving products and services need new payment models that allow all stakeholders to benefit from shared incentives

Given the number of new drugs, innovations and digital solutions coming to the market, the next important step is to ensure access to consumers. To accelerate the shift to value-based health care, new models are required that engage stakeholders and share risk more broadly.

The global pharma industry has started to experiment with different kinds of value based payment mechanisms that deliver meaningful outcomes to different health care stakeholders. The companies are slowly moving away from unit pricing models to a host of new payment models, including:

- Subscription based (monthly fee-for-solution)
- Population-based (global payment for managing population)
- Pay as you live (payment linked to consumer choices)

Pharma players in India are in a nascent stage of adopting new payment models. Leading pharma companies have started exploring new pricing and payment models, such as tiered pricing by for a breast cancer drug and “equated monthly instalment (EMI)” option for a Hepatitis C drug. 18,19

Insurance companies and start-ups are also coming up with new payment models based on digital technology (e.g., telemedicine, mobile apps for health and disease management, etc.). For example, monthly / quarterly / annual subscription plan by an insurer and a start-up that allow unlimited consultations for users and immediate family members.

---

**A futuristic payment model deployed by a top Indian health insurance company**

<table>
<thead>
<tr>
<th><strong>Customer signs up for a health insurance policy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical tests</strong></td>
</tr>
<tr>
<td><strong>No current illness</strong></td>
</tr>
<tr>
<td><strong>Incentivising wellness</strong></td>
</tr>
<tr>
<td>Reward customers who take care of their health</td>
</tr>
<tr>
<td>Reimbursement of a percentage of the premium paid: For leading an active life, for at least 13 days in a month measured through an app, customers could get back 30% of the premium</td>
</tr>
</tbody>
</table>

| **Chronic illness** |
| **Flagship program “chronic care management program”** |
| **Appointment of a health coach** |
| In case of hospitalisation, support through out the process starting from hospitalisation till discharge |

| **Expected result** |
| Can bring down the claims ratio over a period of time by at least 5-10% relative to industry averages for efficient players |

---

As the definition of future value is changing, the payment models in the developed countries are also evolving*

<table>
<thead>
<tr>
<th>Traditional payment models</th>
<th>Emerging payment models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicians</td>
<td>• Pay for performance (P4P) / outcomes-based contracts</td>
</tr>
<tr>
<td>Hospitals</td>
<td>• Episode of care</td>
</tr>
<tr>
<td>Life sciences companies</td>
<td>• Bundled payments</td>
</tr>
<tr>
<td></td>
<td>• Shared savings</td>
</tr>
<tr>
<td></td>
<td>• Shared risk</td>
</tr>
<tr>
<td></td>
<td>• Full risk (capitation models)</td>
</tr>
</tbody>
</table>

*The payment models captured are not exhaustive, the purpose of the figure is to depict the trend of evolving payment models across industry stakeholders

Today these models are emerging in developed countries...

...time is not far when new government programs (e.g., Ayushman Bharat) and increasing adoption of digital in health care in India will encourage these models in the country

**Question to consider**

How can life sciences companies build platform capabilities that enable experimentation with new payment models to deliver shared value to all stakeholders?


Chapter 4

Who is playing a key role in accelerating digital health innovation in India?

- The Government is playing a crucial role in accelerating the development of India's digital health care infrastructure.
- The start-up ecosystem in India is growing at a fast pace and has attained a strong base of >7500 companies.
- Health care and life sciences start-ups are creating technology and science-based innovative solutions that have the potential to address the existing gap in the demand vs. supply of quality health care.
India is slowly progressing on its industry 4.0 journey...

...but the country has the potential to leapfrog the western countries

Western countries saw the advent of technologies more than a
decade ago, developing economies are quickly catching up and
may even have some advantages, including:

• The option to set up a robust system from the start as the
country is not weighed down by legacy infrastructure that might
hinder adoption of best practices

• The flexibility to adopt new and efficient ways of working

The choice to leverage best practices that have emerged as a
result of the trials done in the developed countries.

“National Health Policy”, MHW, Government of India, 2017
The Indian Government is enabling the creation of a cross-sector “digital ecosystem” in the country. The government launched its Digital India program in 2015 aiming to transform the country into a digitally empowered society and knowledge economy.

Realizing the country’s potential to lead in and influence the Fourth Industrial Revolution, the World Economic Forum has partnered with the Government of India to set up the Center for the Fourth Industrial Revolution in Mumbai, Maharashtra. The centre will bring together the government and business leaders to pilot policy frameworks and protocols for emerging technologies.

The National Health Policy (2017) has three distinct goals:

1. Use electronic mediums to gather district-level health data by 2020
2. Reinforce the health surveillance system by establishing registries for specific diseases by 2020
3. Establish federated national e-health architecture, setting-up of health information exchanges and national Health Information Network by 2025

To achieve these goals, the government is establishing regulatory bodies (e.g., National eHealth Authority, National Digital Health Authority, etc.) and launching new legislations and policies (e.g., Digital Information Security in health care Act to regulate digital health data and ensure privacy, etc.).

The “Ayushman Bharat” program was launched in 2018 to address holistic health care delivery:

1. Primary health care: 150,000 health and wellness centres will be created to provide comprehensive primary health care services
2. Secondary and tertiary care: Pradhan Mantri Jan Arogya Yojana (National Health Protection Scheme) is the world’s largest government funded health care insurance program that provides ~100 million families support worth INR 0.5 million per family per year.

This program will be driven by the usage of digital technologies and telemedicine services to improve quality, affordability and accessibility of health care.

The program has three key ambitions: develop digital infrastructure, establish on-demand governance and services, and empower citizens digitally.

Digital health care is one of the key focus areas under the umbrella of the government’s digital initiatives. The Ministry of Health and Family Welfare (MoHFW) has several initiatives designed to deliver better health outcomes. In this case outcomes are defined in terms of access and affordability of care, quality of care, the ability to lower the disease burden and monitoring of health entitlements to citizens.
Shifting consumer preferences and the technological revolution are creating new opportunities for start-ups globally, as well as within India.

India is the third largest start-up ecosystem in the world, only behind the US and the UK, according to NASSCOM. India has a strong start-up base of >7500 companies, with 1200 new start-ups added in 2018. Tech start-ups received more than US$4 billion in the first three quarters of 2018 (+108% vs. same period last year).

Healthtech start-ups, comprising 8% (~600 start-ups) of total start-ups in India, rank fourth on the list behind start-ups developing enterprise (16%), FinTech (14%), or marketplace (12%) solutions.

Methodology: Analysis is based on a survey conducted by EY with the leaders of 46 life sciences and health care start-ups. #There may be overlap in some responses (cases where one respondent has provided >1 factor)

Life Sciences 4.0: transforming health care in India

Indian entrepreneurs have created novel, locally relevant digital solutions that address health care affordability and accessibility challenges. These start-ups are slowly becoming an integral part of the health care system.

In recognition of the importance of a healthy start-up ecosystem, the government launched its Start-up India program in 2016. The number of health care and life sciences start-ups recognized by the government under the program is the second highest, behind only the IT services industry.

Of the 82% respondents, a majority quoted improved affordability and technology as the key differentiators.

- 41 respondents mentioned improved affordability
- 39 respondents mentioned improved technology
- 39 respondents mentioned improved accessibility
- 37 respondents mentioned improved efficiency

**Challenges**

- Funding support: 21
- Regulatory processes: 13
- Collaborations: 12
- Human resources: 12
- Infrastructure/raw material: 10
- Customer trust: 9
- Market access: 8

**Funding** is the key challenge.

- Bootstrapped: 26
- Government incubators: 25
- Innovation based competitions: 24
- PE/VC: 14
- High networth individuals: 9

A majority of the start-ups collaborate with smaller companies with revenues <INR 1 crore as they find it challenging to partner with bigger companies.

**Annual turnover range (INR) of the partner companies**

- <1 crore: 20
- 1-50 crores: 11
- 50-100 crore: 11
- 100-1000 crores: 9
- >1000 crores: 9

**Key government initiatives highlighted by most of the respondents were**

- BIRAC grants
- Start-up India
- DIPP/MSME Schemes
- Nidhi Prayas

**51 out of 60 respondents** mentioned that they are aware of government initiatives to support the start-ups.

BIRAC: Biotechnology Industry Research Assistance Council; DIPP: Department of Industrial Policy & Promotion; MSME: Micro, Small & Medium Enterprises; PE: Private Equity; VC: Venture Capital
Range of innovative solutions developed by the surveyed start-ups

<table>
<thead>
<tr>
<th>Patient lifecycle (41)</th>
<th>Product value chain (21)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disease management</strong></td>
<td><strong>R&amp;D</strong></td>
</tr>
<tr>
<td>Remote patient monitoring</td>
<td>Advanced drug technology platform</td>
</tr>
<tr>
<td>Affordable multi-purpose diagnostic devices</td>
<td>Electronic lab notebooks</td>
</tr>
<tr>
<td>IoT based medical devices</td>
<td>R&amp;D services</td>
</tr>
<tr>
<td>Patient care platform</td>
<td>High quality/affordable testing materials</td>
</tr>
<tr>
<td>Lab free diagnosis</td>
<td>Innovation in cancer research</td>
</tr>
<tr>
<td>Medical device</td>
<td>Novel antibodies</td>
</tr>
<tr>
<td>Robotics-based technology</td>
<td></td>
</tr>
<tr>
<td><strong>Disease treatment</strong></td>
<td><strong>Manufacturing</strong></td>
</tr>
<tr>
<td>Genetic and molecular diagnostics based personalized medicine</td>
<td>Continuous manufacturing devices</td>
</tr>
<tr>
<td>IoT based personalized surgery platforms</td>
<td>3D cell culture technology</td>
</tr>
<tr>
<td>Medical device</td>
<td>Manufacturing services</td>
</tr>
<tr>
<td>AI based robotic prosthetics</td>
<td>Technology for large scale manufacturing</td>
</tr>
<tr>
<td>AI and cloud based surgery devices / platforms</td>
<td></td>
</tr>
<tr>
<td><strong>Disease diagnosis</strong></td>
<td><strong>Sales and marketing</strong></td>
</tr>
<tr>
<td>Early diagnosis</td>
<td>Multi-channel marketing</td>
</tr>
<tr>
<td>Wearables</td>
<td></td>
</tr>
<tr>
<td>Smart medical device</td>
<td></td>
</tr>
<tr>
<td>Remote disease testing</td>
<td></td>
</tr>
<tr>
<td>Precise cancer diagnosis</td>
<td></td>
</tr>
<tr>
<td>Biomedical sensors based diagnostics</td>
<td></td>
</tr>
<tr>
<td><strong>Online portals</strong></td>
<td><strong>Supply chain</strong></td>
</tr>
<tr>
<td>Medicine ordering</td>
<td>End to end traceability and temperature control</td>
</tr>
<tr>
<td>Digital networks</td>
<td>Blood supply chain</td>
</tr>
<tr>
<td>connecting health care stakeholders</td>
<td>Digital networks for real-time monitoring</td>
</tr>
<tr>
<td><strong>Telemedicine</strong></td>
<td><strong>Solution support</strong></td>
</tr>
<tr>
<td>Point of care diagnostics</td>
<td>Information systems</td>
</tr>
<tr>
<td>enabled teledicine</td>
<td>Customized ERP system</td>
</tr>
<tr>
<td><strong>Disease prevention</strong></td>
<td><strong>Customer engagement</strong></td>
</tr>
<tr>
<td>Health and wellness wearables</td>
<td>AR / VR / mixed reality tools</td>
</tr>
</tbody>
</table>

Size of the boxes is indicative of the total number of start-ups catering to the respective areas
Other areas: social network for doctors, Intelligent labor monitoring devices
Source: EY analysis based on primary survey sample set

**Question to consider**

How can health care stakeholders make strategic collaborations with the start-ups to deliver improved products and services?
Chapter 5

As the pace of change accelerates, how can life sciences companies create and staff the work place of the future?

All companies must invest in the three new capabilities: personalization, customer engagement and data literacy.

The first step to building these new capabilities is to define the organizational vision aligned to business models of the Fourth Industrial Revolution.

The next step is to align the digital and talent strategy with this organizational vision.
No matter the business model, succeeding in the emerging platform environment will require new capabilities in three distinct areas: customer engagement, personalization and data literacy.

As discussed briefly in Chapter 3, all Indian life sciences companies, irrespective of the business model, need to focus on building capabilities in three key areas:

Customer engagement: Super consumers today demand the same level of engagement in health care that they have experienced in other industries. Companies must develop capabilities that help them establish trusted and strong relationships with their customers (patients, physicians, providers, insurers, etc.). They should invest in:

- **Platform capabilities**: to deliver seamless experience to the customers by providing relevant information at the desired time, via desired channel/s, and aligned to their values, preferences, and behaviors

- **Talent**:
  - Specialist roles: behavioral scientists; user interface / experience designers who understand customer journeys, profiles and preferences; regulatory experts to guide customer interactions in different geographies, etc.
  - Soft skills: customer first culture, patience, empathy, etc.

- **Personalization**: It is no longer restricted to cancer treatment; it is now desired in all products and services. This is a key opportunity that is emerging from the wealth of data generated via direct customer engagement and other channels. Personalization can not only help companies establish trusted relationships with their customers, but also bring greater efficiencies in how the products and services are delivered and the outcomes they produce

- **Companies must invest in**:
  - **Platform capabilities**: Based on new technologies (e.g., artificial intelligence, machine learning, etc.) that can provide predictive insights to guide superior preventive, diagnostic, and curative decision making
  - **Talent**:
    - Specialist roles: geneticists, technology experts, etc.
    - Soft skills: cognition, design thinking, etc.

- **Data literacy**: Immense amounts of data are being generated across the product value chain and patient journey. Insights from the data can enable achievement of stakeholder satisfaction (by delivering improved products and services) and operational excellence

- **Companies must invest in**:
  - **Platform capabilities**: That enable companies to collect and integrate data from various sources and produce business relevant insights
  - **Talent**:
    - Specialist roles: Data experts, cyber security experts, experts in data privacy regulations
    - Soft skills: Critical thinking, logical reasoning, curiosity, etc.

- **New capabilities**
  1. **Customer engagement**
     - creating high-touch, high-information relationships
  2. **Personalization**
     - in products, services, and solutions
  3. **Data literacy**
     - new currency to value creation in the digital economy
Define a clear vision for the organization

To maximize investments in digital capabilities, companies must align their efforts with the business models of the Fourth Industrial Revolution (discussed in Chapter 3).

Upon defining the vision, biopharma leaders must drive adoption of their digital agenda across the organization. At a global level, we have seen that most major life sciences companies have included new positions in their C-suite establishing Chief Digital and Technology Officers, Chief Data Officers, Chief Patient Officers, and Global Heads of Customer Experience. Many of these positions have been filled by people from different industries to bring fresh perspective and best practices. This desire to create accountability within the C-suite clearly highlights some of the changing talent needs required by the Fourth Industrial Revolution.

To embed these new capabilities in the organization, a shift in mindset is needed. While the C-suite is often well versed in the specific advantages of new technologies, executives in the middle and lower management ranks are still not aware of the efficiencies that can be achieved by using digital. There is a need to dispel all fears related to loss of jobs due to automation and “embrace digital foreman to chairman” mentality.

At the same time, companies should also encourage an appropriate risk-taking culture that incentivizes workers to experiment and learn from failures. While we discussed the need for defining a vision and driving it from the top, it is also critical to ensure that a company has the right resources to achieve its vision. Let us now see how companies can develop their technology and talent resources in line with its overall vision.

Digital strategy

As noted in Chapter 3, most Indian life sciences companies have embarked on their digital journey. However, these efforts remain ad hoc. Companies need to establish end-to-end digital platforms that can transform the business models and enable companies to deliver outcome at the required scale.

The process to set up tech/digital infrastructure should be guided by experts to make sure implementation is cost efficient and delivers the desired results. Below are the broad steps to ensure the digital strategy is aligned to the chosen business model of the company and its broad vision:

1. Assess “entire product value chain” / “all business functions” and define the capabilities needed in the future

The first step to building an end-to-end integrated technological infrastructure is to define the desired future state:

A) Data collection and analysis capability: Data will become an important enabler for life sciences companies to create future value and deliver value-based outcomes. Hence it is critical to build or use an integrated, transparent and interoperable data ecosystem.
Companies need to take a step back and ask:

- What data will they need to collect and from where?
- How will they develop the required insights that will help them deliver personalized products and services, efficiently?

(B) **Usage of new technologies:** Understand the new technologies that are available and how they could be leveraged to improve efficiency (e.g., the use of artificial intelligence to improve drug discovery), achieve transparency (e.g., use of blockchain for data privacy), and deliver personalization (e.g., use of artificial intelligence based algorithms to deliver customized experience to customers).

2. **Perform current state vs. future state gap analysis**

Assess if the existing systems are:

- Robust enough to meet future needs (e.g., increased efficiency, transparency, personalization, etc.) or are they outdated?
- Are they integrated or do they operate in silos?

3. **Decide “what to upgrade” and “what to replace”**

- Replacement of existing systems can be done in two ways, either by purchasing the technology/building it in-house or by partnering with a technology provider/outsourcing to fulfill the need. In some cases, partnering may make the most sense given the pace of technological change and the upfront costs associated with an organic build.

- Ensure that any upgradation or replacement of systems should allow integration with the existing systems and not make them redundant.

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**Notes**

- While building the infrastructure, take all necessary measures to ensure cybersecurity and data privacy.
- Make it a continuous process so your digital technology strategy never gets outdated.

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**Talent strategy**

As organizations begin to adopt a digital mindset and a digital culture, they must realize that all their strategies are only as good as the people who create and implement them. Thus, “employees” are the actual difference-makers and are central to the successful implementation of any strategy. The following activities should be key areas of focus:

**Align organizational needs and workforce capabilities:**

Define the skillset needed for the future that can establish strong customer relationships, leverage data insights to make decisions, and use tools to deliver personalized customer experience.

- What new roles and skillset do you need (e.g., data specialists, behavioral scientists, etc.)?
- What is the base level of digital and data literacy an individual requires depending on their role and function?

---

**EY supported a global conglomerate in designing and delivering digital learning programs**

The digital learning programs were developed across RPA, IoT, analytics, social, mobility and cloud, etc. to the company’s employees in India.

The scope included identifying training needs at an individual level and deliver personalized training plans and content.
After answering the above questions, companies should develop a plan to upskill the existing workforce or hire for very specific roles from outside.

Enable people to perform:

Provide the following enablers:

- Personalized trainings that give employees opportunities to learn and grow
- Right tools, information and incentives to accelerate performance and business goals (e.g., Empowering sales reps with customer insights on the go to enable customized interactions with the physicians)

Also ensure that you place talent in the right places within the organization, across different geographies (as per their skillset and job requirement). Build cross-functional and multi-skilled teams to develop a holistic strategy.

Motivate the employees to go above and beyond for the organization and the customer

It is critical to keep the employees motivated at all times. Give the same experience to your employees that you want them to give to their customers.

No training can upskill an employee who is not motivated enough to learn new skills. An employee who is demotivated can never have engaging interactions with customers.

Transformation can be achieved only when every single employee embraces it. In order to drive the employees to go above and beyond, it is important to:

- Establish a culture that empowers employees by co-creating the future
- Design a total rewards program tailored to the employees
- Set good governance processes that clearly define authority and accountability

Question to consider

In the fast evolving industry, what is your digital talent strategy?
Unlocking the power of data in intelligent ways is both exciting and necessary to fuel innovation and deliver highly personalized health care. This is what consumers increasingly will demand. Higher degrees of personalization will also generate efficiencies and increase effectiveness, aspects welcomed by all health care systems globally.

Pamela Spence, EY Global
Life Sciences Industry Leader
Future Value = \[ FV = I^0 \]

Innovation
- Outcomes X Personalization
  - Participatory
  - Precise
  - Predictive
  - Proactive

Data
- (Connect + Combine + Share)
  - Data streams
  - Platforms of care
  - Traditional and non-traditional partners

For
- People
- Physicians
- Payers
- Policymakers
Conclusions

To create future value, life sciences companies must determine how they can seize the upside of disruption in today’s transformative age.

The ubiquity of data and analytics creates new opportunities for life sciences companies to rethink innovation and create personalized health outcomes that the wider ecosystem of health stakeholders are now demanding.

Platforms that connect, combine and share data will be central enablers of this future value creation.

These platforms create a mechanism for companies to quickly and safely tap into diverse data streams and link them to scientific and clinical data.

Companies will also need to consider developing new capabilities linked to customer engagement, personalization and data literacy that are central to emerging platforms of care.

Life sciences companies can access these capabilities by building them organically or through flexible partnerships or acquisitions.

These customer-focused capabilities will help life sciences companies transform their business models using data to create shared value for themselves and health stakeholders across the ecosystem.

Looking ahead

How will your organization transform its business model to create shared value focused on personalized outcomes fueled by unlocking the power of data?

Will your organization build new capabilities organically, by acquisition or by flexible partnerships?

How will your organization ultimately secure value through platform-based businesses?
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