TECHNOLOGY
FOR PATIENTS:
The new age of human empowerment
IN AN ERA OF RAPID ADVANCES

in science and technology, patients and consumers are taking on an increasingly active role in the management of their health and wellness. The availability of data, ubiquity of cloud capabilities and advances in health-related Internet-of-Things (IoT) devices, combined with extraordinary advances in science, are resulting in new products and solutions that are more relevant, more powerful and more emancipating than ever before in the history of medical science.

Far from an alarming future in which technology dehumanizes our lives, we’re entering an age of human empowerment. Digital health capabilities are becoming a regular component of everyday life and, combined with science, this is raising the bar on the choices available to people across the world. As leading companies take bold steps to make this a reality, we are seeing a life sciences industry that is on the brink of radical reinvention.

In Accenture’s 2016 survey of industry leaders, healthcare, biotechnology and pharmaceuticals were all in the top five industries facing the most digital disruption in the next three years (see Figure 1).1

---

1 Accenture Technology Vision 2016 – Life Sciences Survey Results
Increasingly, we’re seeing life sciences companies designing technology solutions shaped to put the user firmly in control of their own health and how they live their lives with an illness or disability. In an industry traditionally associated with impersonal interactions and difficult choices for patients and their caregivers, it is a major transformation. In bold moves, we are seeing entire digital solutions being classified as class-one medical devices. Where once companies focused solely on biological or chemical therapies, they are now incorporating digital into their product development strategy. That has a material bearing on how life sciences companies interact with patients, healthcare providers and payers. In the process, it’s creating new kinds of relationships.

For example, consider neurological specialist Biogen’s recent partnership with PatientsLikeMe on a study to show how people living with MS can use wearable tracker devices to collect and share mobility data.  The goal? To get relevant information in front of clinicians and fellow MS patients. The outcome successfully demonstrated how technology can be used by patients to self-report data and connect with each other to share information and discuss changing symptoms through PatientsLikeMe’s health platform. Putting patients in charge of their lives changes the game in our understanding of this disease and the ability to develop ever more relevant solutions for patients.

Meanwhile, CVS Health, the US healthcare company, has transformed itself from prescription filler to a provider of healthcare services that are deeply embedded into people’s lives. It’s done this by adopting a holistic approach to healthcare, using technology to put customers’ health at the center of its business. Using a mobile app, customers can set personalized reminders for taking medication, photograph their prescriptions to speed up refills, and scan their insurance cards so store clerks are ready with up-to-date information.

Core Healthcare Ecosystem

Increasingly, we’re seeing life sciences companies designing technology solutions shaped to put the user firmly in control of their own health and how they live their lives with an illness or disability. In an industry traditionally associated with impersonal interactions and difficult choices for patients and their caregivers, it is a major transformation.

In bold moves, we are seeing entire digital solutions being classified as class-one medical devices. Where once companies focused solely on biological or chemical therapies, they are now incorporating digital into their product development strategy. That has a material bearing on how life sciences companies interact with patients, healthcare providers and payers. In the process, it’s creating new kinds of relationships.

Empowering people through technology is at the heart of the 2017 Accenture Technology Vision.

Each of the five trends (AI is the New UI, Ecosystem Power Plays, Workforce Marketplace, Design for Humans and The Uncharted) centers around the core concept of the changing relationship between people and technology and the resulting freedoms to live life in a different way. Crucially, as technology aligns to what we want, and interacts with us in ways that are themselves more naturally human, the world’s becoming a more human place.
Artificial intelligence (AI) is about to become a digital spokesperson for companies. Moving beyond a back-end tool for the enterprise, AI is taking on more sophisticated roles within technology interfaces. From autonomous driving vehicles that use computer vision, to live translations made possible by artificial neural networks, AI is making every interface both simple and smart—and setting a high bar for how future interactions will work. It will act as the face of a company’s digital brand and a key differentiator—and become a core competency demanding of C-level investment and strategy.

Companies are increasingly integrating their core business functionalities with third parties and their platforms. But rather than treat them like partnerships of old, forward-thinking leaders leverage these relationships to build their role in new digital ecosystems—instrumental to unlocking their next waves of strategic growth. As they do, they’re designing future value chains that will transform their businesses, products, and even the market itself.

Driven by a surge of on-demand labor platforms and online work management solutions, legacy models and hierarchies are being dissolved and replaced with open talent marketplaces. This resulting on-demand enterprise will be key to the rapid innovation and organizational changes that companies need to transform themselves into truly digital businesses.

We shape technologies so it adapts to us. The new frontier of digital experiences is technology designed specifically for individual human behavior. Business leaders recognize that as technology shrinks the gap between effective human and machine cooperation, accounting for unique human behavior expands not only the quality of experience, but also the effectiveness of technology solutions. This shift is transforming traditional personalized relationships into something much more valuable: partnerships.

Businesses are not just creating new products and services; they’re shaping new digital industries. From technology standards, to ethical norms, to government mandates, in an ecosystem-driven digital economy, one thing is clear: a wide scope of rules still needs to be defined. To fulfill their digital ambitions, companies must take on a leadership role to help shape the new rules of the game. Those who take the lead will find a place at or near the center of their new ecosystem, while those that don’t risk being left behind.
In the life sciences industry, Artificial Intelligence (AI) is expanding from a backend capability to address new efficiencies and accelerate time-to-market to taking on a much more sophisticated role in making patient and consumer interactions simpler and smarter. When asked, industry executives shared that this expansion of AI’s opportunity is evident: 74 percent of them believe AI will completely transform, or significantly impact, life sciences.7

Al is already proving to have massive benefits in pharmaceuticals and drug discovery. That’s because when Al attuned to the task of drug creation, it can go through combinations of chemicals exponentially faster than a human researcher. Per Accenture Health analysis, Al’s use in key clinical health applications, when combined, can potentially create $150 billion in annual savings for the US healthcare economy by 2026 (see Figure 2).8

---

7 Accenture Technology Vision 2017 – Life Sciences Survey Results
8 “Accenture Health – Artificial Intelligence: Healthcare’s New Nervous System,” Accenture
To further prove this, when asked to identify the greatest benefits of AI in life sciences, industry executives pointed to data analysis and insight, cost savings and consistency across customer interactions. In terms of R&D insights and efficiencies, AI can help to increase trial efficacy and have a positive effect on patient recruitment to these programs.

AI is also playing a critical role in compliance by helping patients adhere to and complete their drug and treatment plans. AiCure, for example, enables medication adherence, both in clinical trials and in other populations, using Artificial Intelligence on mobile devices to confirm that medication has been ingested.10

Many new entrants are emerging in this space. Like Arterys, which has received FDA approval in the area of image analytics for cardiovascular disease diagnostics. The company has introduced a SaaS analytics platform founded on cloud computing and deep learning to revolutionize medical imaging.11

A variety of tools utilizing AI technologies, such as machine learning, deep learning and analytics, are helping patients to improve the way they self-manage a range of conditions. But while diagnostic capabilities powered by AI are advancing at pace, we’ve yet to reach the point where they can take responsibility for the adequate diagnosis-to-treatment cycle.

**FIGURE 2.**
THE TOP-10 USE CASES FOR AI IN HEALTHCARE9

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot-Assisted Surgery**</td>
<td>$40B</td>
</tr>
<tr>
<td>Virtual Nursing Assistants</td>
<td>$20B</td>
</tr>
<tr>
<td>Administrative Workflow Assistance</td>
<td>$18B</td>
</tr>
<tr>
<td>Fraud Detection</td>
<td>$17B</td>
</tr>
<tr>
<td>Dosage Error Reduction</td>
<td>$16B</td>
</tr>
<tr>
<td>Connected Machines</td>
<td>$14B</td>
</tr>
<tr>
<td>Clinical Trial Participant Identifier</td>
<td>$13B</td>
</tr>
<tr>
<td>Preliminary Diagnosis</td>
<td>$5B</td>
</tr>
<tr>
<td>Automated Image Diagnosis</td>
<td>$3B</td>
</tr>
<tr>
<td>Cybersecurity</td>
<td>$2B</td>
</tr>
</tbody>
</table>

TOTAL = ~$150B

Source: Accenture analysis

* "Value" is the estimated potential annual benefits for each application by 2026
** Orthopedic surgery specific

9 ClinGenuity, part of Certara
10 AiCure Website
11 Arterys Website
Collaboration is a driving force behind the evolution of the life sciences sector, as players move to design science and technology solutions that require expertise and skills far in excess of those that one company alone can provide.

This is not lost on industry executives: nearly 90 percent of them said that adopting platform-based business models and engaging in ecosystems of partners, to define, develop, supply and commercialize innovative products and solutions is critical to their success.12 In addition, one-third said that they are aggressively taking steps to participate in digital ecosystems.

The life sciences industry is starting to align on standards and codes of practice that will support platform-based ecosystems, and drive their development forward with industry players, including regulators. An example is TransCelerate, a non-profit consortium of major biopharma companies that is focused on “simplifying and accelerating” the research and development of innovative new therapies.13 This will help life sciences companies speed up their R&D programs to ultimately improve patient care while reducing time-to-market. Industry executives agree. Asked to identify the benefits of participating in digital ecosystems, 50 percent identified increased speed and agility in developing solutions.14

12 Accenture Technology Vision 2017 – Life Sciences Survey Results
13 TransCelerate Website
14 Accenture Technology Vision 2017 – Life Sciences Survey Results
We’re seeing ecosystems emerging across three dimensions:

The first dimension is marked by life sciences companies recognizing that to accelerate innovation and discovery, they need to work together, drawing on the vast amounts of data available from myriad sources. These programs, and the knowledge they represent, are greater than what could be supported by any single life sciences business. The **1000 Genomes Project** and **Precision Medicine Initiative** are just two examples. Others include the **Medidata Clinical Cloud** and the industry-specific platforms built by **Oracle** and **Veeva**.

The second dimension is characterized by patient services platforms that enable the evolution of life sciences companies from volume-based to value-based business models. **Accenture’s Intelligent Patient Platform** and its collaboration with **Boston Scientific** are prime examples of adopting and integrating an insights platform into the healthcare ecosystem to build services around patient needs and deliver value-based outcomes. This cloud-based, data-driven digital health solution for hospitals is designed to help improve patient outcomes and reduce costs to treat chronic cardiovascular diseases. It achieves this by monitoring three key measurements: patient pathway analytics through a hospital system and in a post-discharge environment, care coordination and patient engagement.

Or take **Onduo**, the joint venture between **Sanofi** and **Verily**, an Alphabet company. Focused initially on the type-2 diabetes community, Onduo has developed an algorithm-driven platform to advise on the most appropriate treatments for individual patients by considering factors including patient demographics, individual pathologies, epidemiology and lifestyles. Intended principally for healthcare professionals, the platform’s objective is to move toward personalized treatments for the disease.

The last dimension involves IoT integration and the proliferation of wearables, devices and associated applications. To develop wearables into meaningful tools in the healthcare space, companies need to integrate them seamlessly into their platforms. Integration of devices into the healthcare system is critical in moving to outcome-based or value-based models. The data generated through monitoring works to remove the human error element from treatment and can enable better overall patient outcomes and care. Examples of companies helping to integrate and aggregate data to this end include **Validic** and mHealth connectors like **Medidata** and **Philips Healthcare’s HealthSuite Digital Platform**.

By working with others in the ecosystem, including business partners focused on safely and securely taking data from devices and sensors, life sciences companies can focus their efforts on the scientific value of the data these new devices generate.

**RECOMMENDATIONS**

**TO GET THE MOST OUT OF THE CURRENT INDUSTRY ECOSYSTEM FOR YOUR ORGANIZATION, CONSIDER THE FOLLOWING:**

- Identify the business value of platform approaches and ecosystems to your organization and identify which outcomes you want to achieve.
- Evaluate your enterprise IT and application architecture and provide direction on where platforms and ecosystems can replace legacy systems.
- Understand what new skillsets are required to support ecosystem strategies.
- Get involved in Digital Health start-up initiatives and networks to understand the new technologies available. Consider development of a health technology innovation venturing capability.

---

15 IGSR - International Genome Sample Resource Website
16 Precision Medicine Initiative - National Institutes of Health
17 Medidata Clinical Cloud
18 Oracle Healthcare Solutions
19 Veeva Medical CRM
20 “Boston Scientific and Accenture Develop Data-Driven Digital Health Solution to Help Improve Patient Outcomes and Reduce Cost of Treating Chronic Cardiovascular Conditions,” Accenture, January 28, 2016
22 Validic Website
23 Qualcomm 2net
24 Philips Healthcare’s HealthSuite Digital Platform
WORKFORCE
MARKETPLACE

Enabled by a surge of on-demand labor platforms and online work management solutions, the arrival of the on-demand enterprise underpins the importance of the rapid innovation and organizational changes life sciences companies will need to make in the digital marketplace.

New flexible workforce solutions offer huge potential in many areas of life sciences with some companies even using digital virtual contracting models to flex resources in line with activities across their global locations. This is just one instance of many new approaches life sciences businesses are adopting to enhance their productivity and effectiveness. Many companies have long been enthusiastic outsourcers to reduce costs in what were traditionally manpower-intensive and non-core competency areas of the business (e.g., SG&A). Now, we’re seeing them adopt flexible workforce models to access talent in critical new capabilities like cybersecurity, automation/AI, advanced analytics, the Medical Internet of Things (mIoT), silico genomic target identification and bench research.
There’s also been an evolution from closed employee sourcing models to more open networks for innovation, a process that’s being accelerated by the arrival en masse of millennials (over 50 percent of biomedical researchers, for example, are now millennials). Partnership-based business models and collaboration technologies that connect and leverage shared data are allowing companies to extend well beyond their own boundaries into, among others, universities, teaching hospitals and startups.

This allows them to access previously unavailable talent and knowhow, without having to develop it all in-house. It’s particularly relevant in early-stage R&D. Celgene, for example, maintains over 40 partnerships—in areas including targeted therapies, next-generation biologics, protein homeostasis, epigenetics and stem cell therapy—to accelerate innovation.25

And it’s not just the human workforce that’s changing—machines are becoming essential co-workers, augmenting existing and established processes. Consider the DaVinci Surgical System, provided and developed by Intuitive Surgical.26 We can also see Panasonic’s robotic assistants used in healthcare settings and GSK’s influenza-tracking crowdsourcing tool Flumoji.27, 28

We’re also seeing changing expectations among employees, with organizations redefining how to engage and motivate a changing workforce with new tools and enablers for collaboration. In fact, 73 percent of the life sciences executives we surveyed agreed that their organizations are under extreme competitive pressure to extend innovation into their workforce and corporate structure.29

25 Celgene Partnerships Website
26 Intuitive Surgical Website
27 Panasonic Website
28 “GSK and MIT Flumoji app tracks influenza outbreaks with crowdsourcing,” FiercePharma, January 27, 2017
29 Accenture Technology Vision 2017 – Life Sciences Survey Results

RECOMMENDATIONS

TO HAVE YOUR COMPANY JOIN THE WORKFORCE MARKETPLACE, CONSIDER THE FOLLOWING:

• Based on the interviews of business leaders for pilot opportunities, hone in on the one(s) where the work is already remote, externally sourced, highly variable, cost sensitive or driven by specialist skills. Use this as a first pilot to engage external freelance labor markets and platforms. Upon conclusion of the pilot, perform a debrief and share findings among stakeholders.

• Define and establish the policies, governance and technologies required to respond to the company employing a much more “liquid” workforce.

• Armed with a formal governance structure, policies and best practices, work toward blending internal and external sourcing strategies with a goal of erasing boundaries between your internal organization and the external ecosystem of labor platforms.

• Look for areas that can benefit from automated workforces (bots, AI and machine learning) and apply them to increase efficiency and release funds for re-investment in other areas.
The digital age is enabling a new era of patient empowerment. Patients now expect solutions that meet their needs, giving them unprecedented control over their lives and health. Due to this, technology is increasingly being designed around human needs, rather than around solution requirements. Technology is also adapting to how we behave and learning from us to enhance our lives. For life sciences companies, this is a primary focus geared toward bringing the patient into the heart of everything they do.

Two findings from our research illustrate how important human-centered approaches are for the industry. Over 78 percent of executives agree that a new competitive differentiator for their organization will be understanding the context in the customer experience and creating technology capabilities aligned to human behavior.30 A similar proportion of them, 73 percent, believe that getting this right will enable them to transition from being providers to their customers to becoming their partners.31

---

30 31 Accenture Technology Vision 2017 – Life Sciences Survey Results
Companies are designing technologies in a variety of ways to get closer to patients. As the industry focuses on patient journeys and understanding both the science and the human aspects of living with a disease, innovative approaches are becoming commonplace. These range from connected devices that monitor patients at home to mHealth apps that help patients with compliance, financial assistance and side-effect tracking. Others help patients find specialists, discuss their condition with a physician or access nursing support.

Designing around the patient is proving its value with much improved health outcomes. For example, Proteus Discover uses ingestible sensor-enabled medication that communicates with the patient and sends personalized data to a mobile app and online portal. By monitoring medication and physiology, it helps patients to manage their own health with impressive results. In just four weeks, 85 percent of users achieved their target blood pressure rate (compared with just 33 percent of the control group). Separately, we can even see new processes around clinical trials emerging. Sanofi, Langland and Mendor and eClinicalHealth Limited concluded a completely new type of phase IV trial—the recruitment and homecare process was delivered in collaboration with Facebook.

Approaches like these are generating even more data, which in turn enables companies to create different relationships between pharma and patients. With sufficient volumes of data available, AI can be applied to make designs even more efficient and accurate for human needs. Sources for this range from electronic medical records and clinical data, to the marketplace, social media and beyond. The point is that this can all be used to understand what individuals need through building detailed personae and then providing treatments and solutions that are appropriate to them at specific stages in their lives.

Verily Life Sciences, for example, is developing tools to collect and organize health data, then creating interventions and platforms that put insights derived from that health data to use for more holistic care management. The company’s partnership with 3M Health Information Systems is creating a joint platform for population health management. It analyzes data, spanning patient populations and financial performance, to enable hospitals to improve care quality and reduce costs.

Huge benefits can arise from patient-centric innovation. But failing to respect and protect the sensitivities of the information on which these benefits depend may cause a breach of trust that, in turn, could imperil the flow of data. Actively maintaining patient and customer trust is therefore essential.

IN INCORPORATING MORE HUMAN-CENTRIC DESIGN CAPABILITIES, COMPANIES SHOULD CONSIDER THE FOLLOWING:

• Reassess those internal and external processes that touch patients and customers by applying a human lens that puts healthcare stakeholders at the center of the experience.

• Create a culture that focuses relentlessly on understanding patient and customer needs and continuously evaluating how the organization can change and adapt to bring a better, more “human-centric” approach to the market.

• Embed Design Thinking into the heart of product and/or service development and commercialization strategy.

• Identify the personae critical to the success of the product or service, and understand the outcomes that represent success.
Life sciences businesses face some of the biggest challenges in reconciling the need to bring innovation to the market while maintaining the highest standards of regulatory compliance. Seventy-four percent of life sciences executives believe their organizations are entering entirely new digital industries, and that these innovations are moving them into regulatory grey areas.35

Companies are no longer exclusively focused on developing products that cure or treat diseases—they need and want to go further. They want to bring products and services to the market that truly improve patients’ lives while delivering better outcomes across the constituents in the value chain.

35 Accenture Technology Vision 2017 – Life Sciences Survey Results
The overarching shift from “volume to value” is pushing companies into uncharted territory. As a result, life sciences companies are developing new business models that not only create innovative therapies, but deliver solutions to patients and the healthcare system. New competitors are emerging as well-known “digital” companies like Google, Apple and Amazon become “health digitals.” Meanwhile, traditional therapeutic product companies are becoming “digital health solutions” companies. Within this category, new entrants like Proteus are inventing an entirely new segment of digital health solutions.

Seismic shifts are already in play. Recognizing this, Accenture introduced the Accenture Healthtech Innovation Challenge in 2016 to bring great ideas from start-ups to the attention of big pharma. The purpose of this initiative is to fast-track the adoption of compelling new digital health innovations by the therapeutic area giants, accelerating the potential impact for patients in the marketplace.

Along with new products and services, we’re also seeing technology being used for process optimization and efficiency gains. For instance, in R&D, companies are using digital technologies to vastly improve and accelerate the end-to-end drug development process. For example, BioXcel Corporation recently announced the launch of InveniAI. Its mission? To transform drug development processes and outcomes using big data analytics and machine learning-based AI developed specifically for biopharmaceutical applications.

Or look at what Biogen, Accenture Labs and 1QBit are doing with their development of a first-of-its-kind quantum-enabled molecular comparison application. The application has the potential to significantly improve advanced molecular design by harnessing the power of quantum computing to accelerate drug discovery for complex neurological conditions such as Multiple Sclerosis, Alzheimer’s and Parkinson’s diseases.

Another evolving and radically transformational area for the industry is the advance in genome editing capabilities. Take CRISPR, for example. This new tool allows scientists to edit genomes with unprecedented precision, efficiency and flexibility. In the last few years, CRISPR has achieved multiple “firsts,” from breeding monkeys with targeted mutations to preventing HIV infection in human cells. Once again, there are huge opportunities here. But there are also enormously complex ethical and regulatory issues to be addressed.

With so many start-up companies emerging to develop opportunities in the new life sciences marketplace, disruption will only become more pervasive. Expanding regulatory grey areas will intensify the need for companies and regulators to work together to develop solutions and ensure the pace of innovation continues to grow.

• Develop a program for actively engaging the start-up community as a potential source for new innovations and collaborations. Appoint “Innovation Stewards” within your internal teams, train them in innovation methodologies and foster out-of-the-box thinking using “open innovation.”

• Train your Innovation Stewards to recognize the potential of new technologies and give them the background and tools to understand how these new technologies could impact their own organizations.

• Outline innovation objectives and incentives to stimulate new thinking and encourage experimentation. Build or partner with an organization to rapidly prototype and test promising ideas and concepts.

36 Accenture Healthtech Innovation Challenge
38 Panasonic Website
39 “Accenture Labs and 1QBit Work with Biogen to Apply Quantum Computing to Accelerate Drug Discovery,” Accenture, June 14, 2017
40 “Everything You Should Know About CRISPR—And Where to Learn More,” StartupGrind, November 15, 2016
The life sciences industry continues to face upheaval as change becomes the new normal and disruption continues to be a reality. To step into the people-first digital future, companies will need to:

- **Transform** the core business using robotics and AI to free up capital for investment
- **Grow** the existing business in new and digital ways
- **Scale** new businesses by leveraging new partners and new capabilities—particularly data
- **Leverage** technology to empower people, within the company and out in the marketplace, always ensuring that the needs of patients and customers are put front and center in product and service development and commercialization
- **Take advantage** of new liquid workforce approaches to push greater flexibility and responsiveness into the organization
- **Pivot** very wisely to the “new normal” through non-traditional partnerships, leveraging acquisitions and asset swaps and venturing/partnering with start-ups and new entrants while maintaining and evolving the core business.

**THE TIME TO GET STARTED IS NOW.**
ABOUT ACCENTURE LIFE SCIENCES

Accenture’s Life Sciences group is dedicated to helping companies rethink, reshape or restructure their businesses to deliver better patient outcomes and drive shareholder returns. We provide end-to-end capabilities within or across strategy, consulting, digital, technology and operations around the globe in all strategic and functional areas—with a strong focus on R&D, Patient Services, Commercial and the Supply Chain.

We have decades of experience working hand-in-hand with our clients to improve their performance across the entire life sciences value chain. Accenture’s Life Sciences group connects more than 15,000 skilled professionals in over 50 countries who are personally committed to helping our clients achieve their business objectives and deliver better health outcomes for people around the world.

ABOUT ACCENTURE

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions—underpinned by the world’s largest delivery network—Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With approximately 401,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. Visit us at www.accenture.com.