

Pharmaceuticals & Medical Products Practice

# The technology imperative for life sciences

Digital disruption has reached the healthcare sector, and with it comes an imperative for life-science companies to retool core technology to remain competitive. Here are ten guidelines for success.

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**Across life sciences**, a certain posture toward IT has prevailed for years: “IT doesn’t provide our business with a competitive advantage, only basic capabilities. We should therefore minimize IT expenses while maintaining an acceptable level of performance.” Budgets are aligned to plans a year in advance, and IT is regarded as a cost center. Since IT is charged to build the technology that the business asks for, it requires teams of analysts to sit between the business and developers to translate business concepts into the language of technology.

For many years, this posture was pragmatic—and perhaps even necessary. IT organizations had to focus on implementing core enterprise-resource-planning systems, untangling siloed infrastructure from years of M&A activity, standardizing processes, and providing basic technology literacy for their business counterparts.

This perspective no longer holds for true digital leaders and will not last for the life-science industries. The mandate coming from boards, CEOs, and business leaders is to aspire to digital excellence. However, without equal attention to IT, these efforts struggle to move from experiments to true change at scale.

The IT function must move closer to the business and customers so companies can meet the rising expectations of end users and seize the powerful first-mover advantages that accrue in digitizing markets. These advantages include unlocking data for better decision making, creating solutions that complement commercial offerings, engaging with customers, and reimagining internal processes. Enterprises on a path to lead the pack have a clear strategy that includes ten technology plays—without it, they can only fall further behind.

## **What technology means for life-science companies today**

The wave of digital disruption has now reached the healthcare sector. While there is still debate around the scale and pace of change this will bring for the

industry, there is little doubt that the change is well under way. Several disruptive forces have been pushing this boundary in the healthcare sector and are changing the way care is provided:

- Patients are more engaged with their care and expect the same convenience and transparency for healthcare services.
- There is new desire to access and use the data that are already created to provide transparency into product performance.
- Advanced analytics, automation, and the cloud are making it easier to increase productivity and improve the quality of decision making.
- Digitization has started to move beyond the digital pill to improve outcomes and provide personalized medicine.
- Digital ecosystems are playing an increasingly important role.
- New, nontraditional tech players are intervening.

As a result, incumbents need to lean into a new technology-forward strategy to compete with the flexibility and speed of digital natives. Because these trends have been evolving for years, many organizations started to take steps to address them. For example, companies have elevated the digital agenda to the C-suite, hired chief digital officers, and created focused organizations to start experimenting with a laundry list of digital use cases. Despite the recent shifts, the sector continues to lag behind most industries and is not yet where it needs to be—truly transforming at scale.

To unlock bold digital aspirations in modernizing core technology, a fundamental retooling is required. From our work in life sciences and other industries, we have highlighted the ten technology plays required to become a leading technology organization across three vectors:

1. Reimagine the role of technology, with a shared, business-backed vision focused on user-centric products.
2. Reinvent technology delivery through agility at scale, a cloud-first approach, and a flexible ecosystem of partnerships.
3. Future-proof the foundation through modern platforms, modular architecture, and cybergovernance.

## The ten technology plays for a high-performing technology organization

Life-science companies have a distinct opportunity to gain true competitive advantage over peers by modernizing their core technology. From our research, we know that digital maturity is associated with better business outcomes (for example, five times the revenue compound annual growth rate and better delivery of products). Almost all industry leaders understand the motivation, and many have started down the path in some form, but few (if any) have all ingredients of a true core-technology transformation.

While some of the ten plays are already pervasive within the pharmaceutical industry, others are emerging, and some remain nascent:

### — Reimagine the role of technology:

- **Play 1: shape a tech-forward business strategy, with a bold, business-led vision (pervasive).** Leading companies form an ambitious vision around business priorities that are aligned and supported by top management. This holistic, end-to-end strategy looks beyond piecemeal technology upgrades and embraces the idea that a true technology transformation is a never-ending journey. Organizations that live up to this principle have elevated the chief information officer or technology leader to the executive-committee level and frequently engage the board on digital and technology.
- **Play 2: integrate tech management through product- and platform-centric technology organization (nascent).** Business and technology teams organize around clear products and platforms. Product teams deliver customer-facing digital products, with ownership of end-to-end journeys. Platform teams deliver a capability (for example, business line, enterprise, and enabling) that is largely self-contained, with a collection of assets, funding, and talent.
- **Play 3: become a steward of user experience by developing customer-centric, design-based products (emerging).** Human-centered design uses empathy to develop solutions that work for people. Customer and patient needs are internalized at the center of product development, and features that provide direct value to the customer are built. This user-centric approach leverages technology and data to eliminate the need of repeating research (for example, asking customers questions they have already answered) and follows an iterative design and prototyping approach to iterate rapidly between wire frames, working prototypes, and minimum viable products.
- **Reinvent technology delivery:**
  - **Play 4: drive agility as a core way of working with joint teams consisting of business and tech members (pervasive).** The ability to reconfigure strategy, structure, processes, people, funding, and technology quickly and efficiently toward value-creating and value-protecting opportunities is key. It is built on the principles of rapid iteration, dynamic people models, entrepreneurial drive, flat structures, a North Star vision, and measurable team outcomes.
  - **Play 5: ensure automated platform thinking with a cloud-first mind-set (emerging).** A well-defined cloud (public and private) and platform strategy forms the transformation path while capturing value along the way. It is supported

## Full-scale platform transformation at Boehringer Ingelheim

**Clemens Utschig-Utschig** is the chief technology officer of Boehringer Ingelheim (BI), one of the world's 20 leading pharmaceutical companies, and the leader of its platform-transformation program. The focus of the family-owned company, founded in 1885, is researching, developing, manufacturing, and marketing new medications of high therapeutic value for human and veterinary medicine. Utschig-Utschig discussed with McKinsey how the research-driven company approached its technology transformation.

**McKinsey:** How did BI begin its technology transformation?

**Clemens Utschig-Utschig:** We began with a plan to reduce the size of our application landscape from more than 4,000 in 2012 to less than 1,000 in 2021. Also, a top-down mandate was made that every new application must run on one of six enabling IT platforms—for example, Amazon Web Services, Azure, OpenShift. For BI, this was

not about hosting but rather dramatically reducing time to market through one common, compliant, highly automated delivery chain—from requirements to quality testing to documentation generation.

**McKinsey:** What did BI use to guide its transformation journey?

**Clemens Utschig-Utschig:** We started our journey by setting a North Star—a business-backed vision to run and deploy any solution as quickly as a digital-native software-development company without compromising quality. This required four foundational elements [exhibit]:

1. **One application life cycle.** We established one process and one tool chain across all platforms.
2. **Six future platforms.** Select core-technology-platform leaders evaluated all platforms and prioritized the few that were expected to have longevity.

This allowed us to implement one application life cycle and, more importantly, have enough functionality coverage to justify the effort and initial implementation cost.

3. **Platform-first strategy.** It was well communicated and understood by stakeholders that all new applications that were not SaaS [software as a service] would go onto platforms, with a rigorous and strict process for exceptions.

4. **A new IT-platform organization.** To harness economies of scale plus also give people who were passionate about platform engineering a new “home,” a new IT-platform organization was created that would operate—a little bit—like the most innovative high-tech companies.

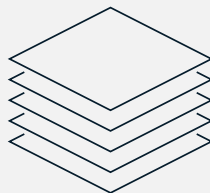
Exhibit

**Platforms allow for fully automated, scalable processes; higher efficiency; and decreased time to market.**

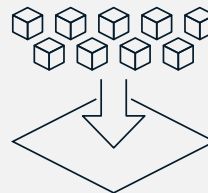
### Foundational elements for technology transformation



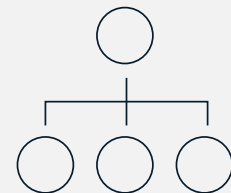
**1 application life cycle**  
Harmonization of existing development services into one central ecosystem, with automated processes for whole application life cycle



**Technology platforms**  
Definition of platform environment, including existing and new platforms; embedment of platforms into 1 application life cycle



**Platform-first strategy**  
Inclusion of all new applications (excluding software-as-a-service applications) onto platforms



**Organizational setup**  
Setup of new unit within IT to support, maintain, and develop ecosystem and platforms

## Full-scale platform transformation at Boehringer Ingelheim continued

**McKinsey:** To establish platforms, what protocols were important in enabling automated building, testing, and good-practice documentation?

**Clemens Utschig-Utschig:** BI designed our agile software-development and software-deployment processes to meet the formal needs of industry-specific good practices, such as in risk management, documentation, and validation. Every change to software had to be traceable, from requirements—including changed requirements—to the code deployed in production.

To provide standardized, automated processes, we also engineered common components into our platforms. The common components included orchestration workflows, source-code reviews, automated testing—on code and functionality—and

use-case blueprints that users would be able to start from when building new products or bringing commercial off-the-shelf applications to market.

All of this work was open sourced on GitHub under OpenDevStack to drive the adoption and development of DevOps principles and cutting-edge software development.

**McKinsey:** How has the IT organization at BI evolved?

**Clemens Utschig-Utschig:** The first is the use of dedicated product teams, which each support a product's whole life cycle—from inception to production. These product teams serve as an innovation kernel and are also fully embedded in the IT organization. They strictly follow agile methods to enable rapid delivery.

Team members are dedicated to their products, with 20 percent of their time devoted to broadening their knowledge and working on pet projects. This construct helped with focus and speed for new features. While the teams have functional managers to connect back to the IT organization, they organize themselves and are close to the respective product owners on the business side.

The second dimension is the establishment of chapters, organized by skill and role—for example, IT engineering and data science. The design is evolving for practicality, including in how the organization can best bridge time zones and language barriers. The chapters span all functional IT towers and are matrixed to help spread knowledge and react to issues.

by a mind-set of “automation of everything” (for example, setting up a new server and using continuous delivery, testing, monitoring, and deployment) and breaking down traditional development and operations silos. This will also require a view on how traditionally hosted applications, private-cloud platforms, and workloads in public clouds will fit in the future company

- **Play 6: embrace engineers and doers as the heart of the organization (emerging).** Leading companies have a highly skilled workforce with a high proportion of new digital skills (design, engineering, data science, and digital-product ownership). To support this, career tracks that encourage technical growth

as well as managerial growth (rather than only celebrating managerial growth), along with different incentive models, need to be developed. These organizations are often characterized as having a culture of autonomy and ownership.

- **Play 7: create a diverse set of external partners but ensure critical roles are in house (nascent).** Leverage a diverse set of partner models—traditional outsourcers (for example, those offering standard development capabilities), niche partners (for example, design-focused groups), and platform technologists (for example, open-source or cloud providers). Prioritized capabilities are internalized (for example, by work identified

as high value, high cost of delay, or consistent demand), and delivery between the partners and the organization is done with shared responsibility.

— ***Future-proof the foundation:***

- ***Play 8: simplify to a flexible and modular architecture delivered iteratively (nascent).***

Common designs, patterns, and practices can assist teams in quickly building new applications, services, and infrastructure as well as modernizing legacy. Moreover, the architecture looks to decouple technology platforms to enable the perpetual evolution necessary for digital growth. Among the challenges to this model is how to migrate and modernize existing application landscapes toward digital platforms while staying compliant with regulatory requirements (for example, good manufacturing practices, good clinical practices, and data-privacy requirements).

- ***Play 9: harness value from data and the power of artificial intelligence (emerging).*** It is important to have easy and ready access to quality data (data are available, cleansed, structured, consistent, timely, and accurate). Data analytics are enabled through a modern data platform, including unstructured storage, advanced analytics, and easy-to-use tools. Exposed data from within applications are made easily accessible, as resources and all risks associated with data are embedded in the culture.

- ***Play 10: create world-class cybergovernance and privacy as table stakes (pervasive).***

Trained and informed frontline personnel can ensure that cyber practices are embedded into frontline activities. This means integrating cyberresilience into enterprise-wide business and governance processes and prioritizing information assets to engage business leaders.

While many of these plays are individually not novel, high-performing organizations look to address all ten holistically. Other sectors (for example, banking and high tech) have made significant headway in adopting the tech plays holistically, whereas the life-science sector continues to lag behind. While some have made significant progress at a few of the plays, very few have successfully been able to unlock the value of all of them.

## **Getting started on the tech transformation**

The plays must be core to the chief information officer or chief digital and technology officer's strategy and on the executive-team agenda—each with a clear aspiration, path to achieve it, and the capabilities necessary to realize the impact. With them, life-science companies can continue to remain competitive with peers, disruptors, and digital natives. Without them, life-science companies risk falling years behind.

To get started, a self-reflection on where you stand and where you want to be is necessary:

- How will your organization create transformational value in the next three years?
- Of the ten plays, where do you rank on maturity, and where do you want to be?
- What is the current path to transform the core to modern delivery and platforms?
- How will the business and technology groups partner to deliver on a bold, joint vision?

Beyond answering these initial questions, we see organizations successfully jump-start their core-technology campaigns by following a three-step process:

1. Ensure a shared vision of the digital aspiration for the company and the technology transformation that must exist to make it a reality.

2. Define your baseline IT capabilities (for example, through tools like Technology Quotient) to understand the strengths and the capabilities you need to improve.

3. Select two or three plays to double down on leadership focus up front—and, at the same time, build a synchronized road map to scale business value and reinvent the core.

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The pressure on the healthcare sector to improve and evolve is massive. Technology will be the key to unlock immense value—or the barrier that holds it back. For the companies that will lead the pack in the future, the technology overhaul is already under way (see sidebar, “Full-scale platform transformation at Boehringer Ingelheim”).

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