IDC FutureScape

IDC FutureScape: Worldwide Life Sciences 2024 Predictions

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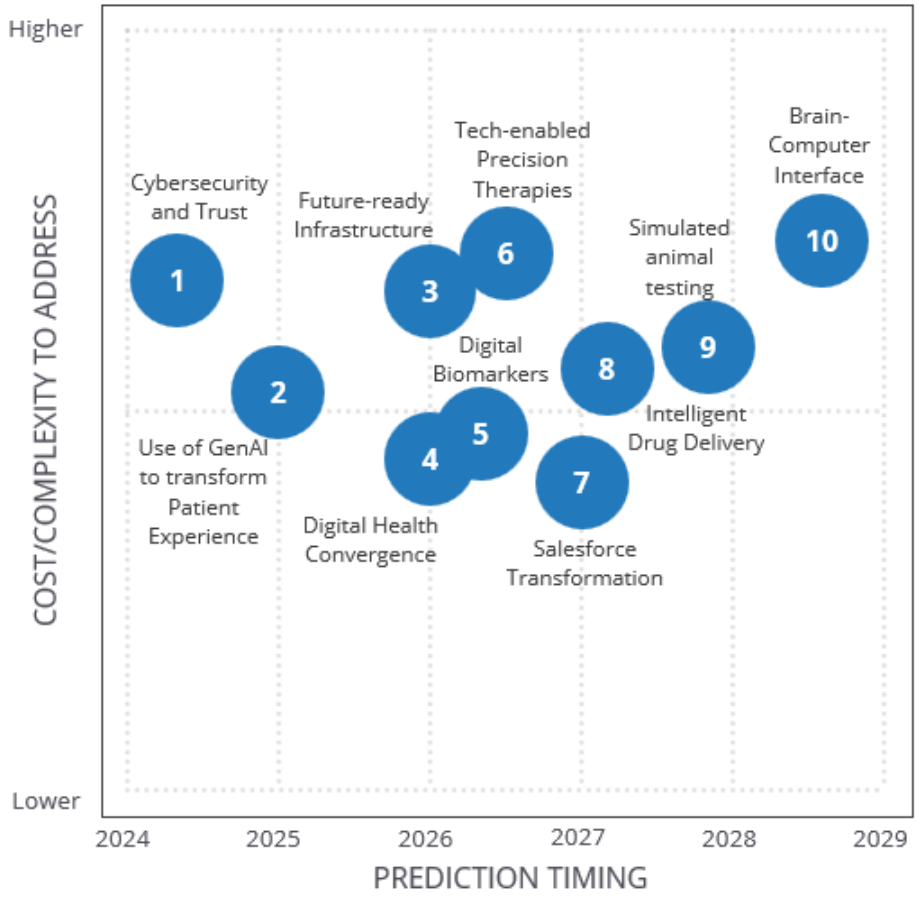
IDC FUTURESCAPE FIGURE

FIGURE 1

IDC FutureScape: Worldwide Life Sciences 2024 Top 10 Predictions



Note: Marker number refers only to the order the prediction appears in the document and does not indicate rank or importance, unless otherwise noted in the Executive Summary.

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EXECUTIVE SUMMARY

This IDC FutureScape for life sciences (LS) provides valuable insights and guidance to IT and business executives across the globe on key trends that are forming and shaping the life sciences industry. The intended readers include but are not limited to business, clinical, and IT leadership of life sciences organizations worldwide.

Not so long ago, the world was majorly disrupted by the COVID-19 pandemic and the life sciences industry quickly rose to the occasion and led the way, developing vaccines in record time. Just when one thought that the dust was settling, the world was once again disrupted by geopolitical turbulence fueled by the Russia-Ukraine War and economic uncertainty, leading to a recession. As the C-suite's focus shifted from "growth" to "efficiency," yet another disruption came along — generative artificial intelligence (GenAI). Large language models (LLMs), which are powering generative AI, democratized the use of AI. To quote the CEO of an American multinational technology company that pioneered accelerated computing, "everyone can be a programmer" since generative AI can understand multiple forms of input, including speech. Almost 40% of the life sciences industry is already using or piloting GenAI tools for digital transformation (DX) initiatives (source: IDC's *Life Sciences Digital Transformation Survey,* May 2023). While the interest in leveraging generative AI is spreading like wildfire, it has its own share of skeptics who remain deeply critical of the potential risks it may present, especially since this industry deals with both patients' lives and patients' data. The world's first comprehensive AI law, the AI Act, was passed by the European Union (EU) in June 2023. The industry is on a learning curve as regulations are still evolving, but this has been a seminal moment for the entire world. The life sciences industry has taken note and is moving fast. There is no going back.

The 2024 predictions of this IDC FutureScape suggest that, in the next five years, life sciences organizations will leverage generative AI, transforming business processes and scaling efficiencies exponentially. What can be automated will be automated. Digital transformation will continue to lead the way, ensuring resiliency and fueling innovation and growth.

The predictions explore several key themes concerning the life sciences industry, including the following:

- "Design as a service" is the new model for drug discovery as innovative TechBios leverage generative AI to design novel molecules.
- "By design" strategies — spanning "privacy by design," "security by design," "quality by design," "sustainability by design," and "diversity by design" — are now the top priorities.
- Control planes and modern digital infrastructure will be the pillars for scaling innovation.
- Integrated solutions, connected devices, and health data platforms will help generate a 360-degree view of patients, which will power hyper-personalized experiences and improved outcomes.
- "It's all about you" will go to the next level, weaving in home care, intelligent drug delivery, and precision therapies, creating a new category of patients with far more demanding expectations.
- It is and will continue to be a data-hungry world. The need for large domain specific data sets to train LLMs will prove to be a big challenge to the industry.
- An interesting paradigm is evolving. Not only are biotechs adopting technology but TechBios are also transforming from technology companies to biotechs.
- There is a growing confluence between healthcare and life sciences. Technology providers are taking note and are re-architecting their offerings to address emerging market needs.

- Pharmas, biotechs, and medical device companies are rapidly transforming their business processes and upskilling their teams to be able to hop on to the fast-moving GenAI bus.
- Digital resiliency remains top of mind as the industry remains wary of the possibility of a resurgence of another pandemic — and a volatile economic scenario.
- As ransomware attacks on the life sciences industry continue to grow, there is a deep focus on "zero trust." Microsegmentation will play an important role in ensuring secure and controlled access to resources across multiple environments, as the life sciences industry moves toward adopting hybrid multicloud strategies.
- The top 3 businesses priorities for the life sciences industry are sustainability, employee productivity, and reducing business risk (source: IDC's *Future of Trust Survey,* January 2022).
- Regulators are opening up to the use of technology. For example, the FDA recently made a path-breaking decision to no longer mandate animal testing for new drugs prior to clinical trials and allow computer simulations, organoids, and "organ on a chip" (OOAC) to be used instead. Regulators across the globe are encouraging the use of real-world data (RWD) as well.
- As one enters previously unexplored terrain, one sees the next level of innovation happening. A brain-computer interface (BCI) can enable people with neurodegenerative disorders that have communication or mobility impairments to walk or communicate once again, as their thoughts communicate with computers to control their actions.
- Fiction is rapidly becoming a reality, and the life sciences industry is redefining reality itself.

The worldwide life sciences industry predictions for 2024 are as follows:

- **Prediction 1:** By 2024, 70% of life sciences organizations will prioritize security-by-design, privacy-by-design, and zero trust initiatives to enhance cyber-resilience and build trust, fueled by evolving regulations**.**
- **Prediction 2:** By 2025, transformative patient experiences will be led by 30% of life sciences firms that used GenAI to optimize trial design, hyper-personalize content, and orchestrate empathetic interactions.
- **Prediction 3:** By 2026, 65% of life sciences companies will modernize digital infrastructure, adopting unified control planes to optimize and scale intelligence-driven innovation and to ensure regulatory compliance.
- **Prediction 4:** Pushed by data-driven market models and patient care needs, 40% of life sciences companies will adopt integrated solutions combining connected medical devices and digital health platforms by 2026.
- **Prediction 5:** Fueled by connected health devices and AI-based analysis tools, the market for digital biomarkers will double by the end of 2026, lowering healthcare costs while aiding in R&D and outcome measurements.
- **Prediction 6:** By 2026, the adoption of GenAI-based drug design, the intelligent supply chain for cell and gene therapies, and digital therapeutics will scale the growth of precision therapies by 60%.
- **Prediction 7:** Despite the decreasing field sales head count, GenAI enhancements in commercial life sciences software will lead the industry to a 40% rise in personalized engagements with healthcare providers by 2027.
- **Prediction 8:** Evolving home care initiatives and patient expectations will triple the use of intelligent device-based drug delivery systems by 2027, followed by vectorized antibodies and gene delivery nanocarriers.

- **Prediction 9:** By 2027, one-fourth of the life sciences industry will supplement but not replace animal testing with computer simulations, organoids, and organ on a chip, prioritizing neurological diseases.
- **Prediction 10:** Approvals for clinical trials focused on a brain-computer interface will double by 2028, prioritizing neurorehabilitation while implementing strict guardrails to ensure data privacy and patient safety.

This IDC study discusses the top 10 predictions for the life sciences industry for 2024.

"'Reinvent' is very much the new tagline for the life sciences industry. The 2024 worldwide life sciences industry predictions focus on how the life sciences industry is reinventing itself by embedding 'as a service' and 'by design' strategies in its business models, leveraging GenAI to reimagine business processes, and weaving in intelligence and 'hyper-personalization' every step of the way," says Dr. Nimita Limaye, research VP, Life Sciences R&D Strategy and Technology at IDC Health Insights.

IDC FUTURESCAPE PREDICTIONS

Summary of External Drivers

- **AI everywhere –** Generative AI takes the spotlight
- **The drive to automate –** Maximizing efficiency and new opportunities
- **Cybersecurity and risk –** Building resilience against multiplying threats
- **The digital business imperative –** Competitiveness and outcomes
- **Dynamic work and skills requirements –** New work mode era
- **Shifting tech regulatory landscape –** Navigating risk and opportunity

Predictions: Impact on Technology Buyers

Prediction 1: By 2024, 70% of Life Sciences Organizations Will Prioritize Security-by-Design, Privacy-by-Design, and Zero Trust Initiatives to Enhance Cyber-Resilience and Build Trust, Fueled by Evolving Regulations

The life sciences sector faces increasing cyberthreats jeopardizing intellectual property (IP), R&D, manufacturing, and finances. Accelerated digital transformation, cloud adoption, and the expansion of life sciences ecosystems have amplified the risks. COVID-19, geopolitical upheavals, and the Russia-Ukraine War have magnified these challenges. From January 2021 to March 2023, European pharmas encountered an average of 18 incidents per entity (source: ENISA, July 2023), and the rise of connected medical devices has worsened the situation. As per a September 2022 FBI report, 53% of U.S. hospital Internet of Things (IoT) devices had known critical vulnerabilities (source: Linn Freedman, *JD Supra LLC,* "FBI Issues Notice to Health Industry Highlighting Risks of Unpatched Medical Devices," **www.jdsupra.com/legalnews/fbi-issues-notice-to-health-industry-3981346**, September 16, 2022). The IoT applications are extending across inpatient and home care settings and are broadening the attack surface, which is raising serious concerns over care quality and safety.

Regulators worldwide are creating laws and policies to increase cyber-resilience. The new U.S. FDA guidance (in April 2023) defines robust cybersecurity requirements that medical devices must fulfill before entering the U.S. market. Data security and privacy have emerged as the top challenge for over half of the industry. So enhancing them has become a top priority (along with IoT investments) for life sciences organizations worldwide (source: IDC's *Life Sciences Digital Transformation Survey,* 2023).

Organizations are focusing on proactive approaches to security, embedding trust in their core strategies and managing security across the product life cycle. Security-by-design, privacy-by-design, and zero trust initiatives are gaining momentum to strengthen cyber-resilience and trust and to protect the health of organizations and patients.

Associated Drivers

- **Cybersecurity and risk —** Building resilience against multiplying threats
- **Dynamic work and skills requirements —** New work mode era
- **Shifting tech regulatory landscape —** Navigating risk and opportunity

IT Impact

- Security incidents can cause major harm to organizations, damaging brand reputation and trust and leading to financial losses such as regulatory penalties.
- Investments must increase in internal security capabilities and in building robust cybersecurity solutions.
- "By design" practices not only help enhance cyber-resilience and regulatory compliance but also lower costs and help build an ecosystem of trust.

Patient Impact

- Security incidents can lead to health service disruptions, affecting care access, safety, and patient outcomes. Moreover, security breaches may be life-threatening (e.g., in the case of cardiac devices).
- Enhanced security leads to improved patient experience and trust.

Guidance

- Adopt a proactive approach to cybersecurity, and from the earliest stages of product development, plan for alignment with security-by-design and privacy-by-design principles.
- Develop trust frameworks and practices for the implementation of zero trust strategies.
- Leverage AI and analytics in cybersecurity processes, and consider investments in compliance-as-a-service offerings.

Prediction 2: By 2025, Transformative Patient Experiences Will Be Led by 30% of Life Sciences Firms That Used GenAI to Optimize Trial Design, Hyper-Personalize Content, and Orchestrate Empathetic Interactions

The rapid growth of decentralized clinical trial models and the shift to remote patient interaction channels resulted in an industry that became laser focused on enhancing patient experience. IDC's May 2023 *Life Sciences Digital Transformation Survey* showed that improving patient experience (as indicated by 42% of the respondents) is one of the top 3 drivers for digital transformation. Patient data is being analyzed to develop a holistic 360-degree view of patients, optimize trial design, tailor empathetic messaging, and create real-time, hyper-personalized, "patient centric" experiences. Generative AI can scan structured and unstructured patient data and can generate intelligent patient summaries. These summaries enhance interactions between investigators and patients, while AI chatbots directly address patient questions.

A survey of 2,000 patients conducted by the University of Arizona Health Sciences found that about half of these patients, especially older and conservative ones, favored traditional healthcare providers (HCPs) over AI-powered chatbots such as ChatGPT. Yet they grew more trusting of AI bots, particularly GenAI chatbots, upon receiving positive provider reviews. On the other hand, a study in the

Journal of the American Medical Association Internal Medicine revealed AI chatbots provided more comprehensive, empathetic, and higher-quality responses as compared with physicians, especially for nuanced tasks such as answering patient questions. Leading pharmas are using GenAI chatbots to answer common customer queries and provide personalized recommendations, resulting in significant improvements in customer satisfaction and response times. GenAI solutions are being developed to optimize clinical trials by analyzing feasibility, design, and diversity and to even predict clinical trial success with high accuracy. These GenAI solutions will work toward creating hyper-personalized content and orchestrating empathetic interactions to drive persistent and enriched patient experiences and clinical outcomes.

Associated Drivers

- **AI everywhere —** Generative AI takes the spotlight
- **The drive to automate —** Maximizing efficiency and new opportunities
- **The digital business imperative —** Competitiveness and outcomes

IT Impact

- Developing and prioritizing use cases will require IT to collaborate extensively with business.
- Investment in fine-tuning patient experience platforms to enhance effectiveness is a must.
- Data sovereignty, regulatory compliance, and data ownership issues must be addressed.

Patient Impact

- Hyper-personalized models will enhance patient experience and improve retention while creating a more demanding patient base, as patient expectations are rapidly evolving.
- Optimization of trial design to meet patient's needs will improve outcomes and access to care.

Guidance

- Use GenAI to hyper-personalize patient experiences but keep the human-in-the-loop.
- Create a curated enterprisewide clinical data pool for GenAI to learn from and become agile in responding to patients' personalized queries.
- Use GenAI to optimize trial design and weave-in options that provide patients with choices.
- Implement the necessary guardrails, especially when developing digital therapeutics related to mental health. Models need to be thoroughly validated, and patient safety comes first.

Prediction 3: By 2026, 65% of Life Sciences Companies Will Modernize Digital Infrastructure, Adopting Unified Control Planes to Optimize and Scale Intelligence-Driven Innovation and to Ensure Regulatory Compliance

Life sciences IT infrastructures are becoming more complex because of the diverse workloads they must support. Modern workloads leverage a wide and fast-evolving array of compute platforms, storage systems, cloud services, networks, edge, virtualization, and containers. Control planes facilitate resource deployment across regions, achieving technology parity for researchers and collaborators across the world. They can also automate the integration of data generated by the Internet of Medical Things (IoMT) with other research data sets in decentralized clinical trials. According to IDC's *Life Sciences Digital Transformation Survey,* workloads are distributed across various environments: 36% in public cloud, 16% in hybrid cloud, 19% in private cloud, 20% on premises, and 10% at edge locations.

Digital infrastructure performance affects critical business outcomes such as accelerated R&D, enhanced customer and patient engagement, efficient operations, and increased employee productivity. Life sciences organizations recognize the importance of digital infrastructure, safeguarding infrastructure, and IT optimization projects from budget cuts, regardless of economic conditions (source: IDC's *Future Enterprise Resiliency and Spending (FERS) Survey, Wave 2,* March 2023). Top life sciences organizations are investing in unified management control planes to simplify infrastructure operations. They leverage observability, automation, and security tools to address key challenges such as data security and compliance.

Associated Drivers

- **Cybersecurity and risk —** Building resilience against multiplying threats
- **The digital business imperative —** Competitiveness and outcomes
- **Shifting tech regulatory landscape —** Navigating risk and opportunity

IT Impact

- IT will increasingly collaborate with business colleagues and developers to analyze workload needs and optimize infrastructure performance and costs.
- Higher observability and automation will challenge traditional norms in digital infrastructure architecture, operations, staffing, governance, and funding.
- Preparing for security, regulatory, and compliance needs in an automated digital infrastructure demands a profound grasp of data logistics and workflows.

Patient Impact

- Higher infrastructure resilience and agility lead to greater product and service availability.
- The unified approach to patient data protection and end-to-end security management, along with increased adaptability to evolving policies, will bolster patient trust and engagement.
- Cloud services and technology will accelerate innovation, expanding care options for patients.

Guidance

- Set business metrics to align digital infrastructure's costs, security, and performance with dynamic business needs and innovations. Allocate resources for analyzing workload-specific requirements, and understand the risks tied to unmet needs.
- Prioritize investments to boost interoperability by utilizing APIs, unified control planes, consistent security protocols, and comprehensive data logistics across diverse environments.
- Leverage the enhanced infrastructure visibility to further streamline environments, modernize when feasible, and proactively anticipate the requirements of upcoming workloads.

Prediction 4: Pushed by Data-Driven Market Models and Patient Care Needs, 40% of Life Sciences Companies Will Adopt Integrated Solutions Combining Connected Medical Devices and Digital Health Platforms by 2026

The surge in connected health tech is shifting life sciences to patient-centric virtual environments, fueling decentralized trials and virtual care adoption, and blurring the boundaries between healthcare and life sciences. Patients are gaining care choices, and the reach of research is expanding. IDC forecasts that remote patient monitoring systems will grow at a 15% CAGR in the next five years (source: IDC's Worldwide Digital Transformation Spending Guide, April 2023). Real-world data collected from remote monitoring devices, platforms, and apps generate real-time insights and inform decisions that foster patient-centric care and research models, thus driving patient experience,

satisfaction, and outcomes. Real-world evidence also plays a key role in outcomes-based reimbursements.

To leverage the potential of connected devices, life sciences companies need digital capabilities for data collection, orchestration, and analysis. IDC estimates that 30% of life sciences and healthcare organizations (HCOs) are currently testing or planning to use unified patient data within the next year, spanning a broad spectrum of applications (source: IDC's *Future Enterprise Resiliency and Spending Survey, Wave 1,* January 2023). Hence life sciences organizations are intensifying data integration strategies and investing in digital platforms for diverse multisourced data, including devices' and health providers' data. Mastering this data can bridge care gaps, fostering integrated patient journeys and enhancing patient experiences and outcomes in both research and care settings.

Associated Drivers

- **AI everywhere –** Generative AI takes the spotlight
- **The digital business imperative –** Competitiveness and outcomes
- **Shifting tech regulatory landscape –** Navigating risk and opportunity

IT Impact

- Robust, dependable networks are essential to uphold IoMT.
- Companies must invest in digital capabilities for the collection, analysis, and orchestration of data. Interoperability and data integration is crucial for seamless data orchestration on digital platforms.
- Advanced analytics and AI will extract valuable insights from connected medical devices' data.

Patient Impact

- Connected devices will enable increased access to clinical trials, enhancing patient diversity.
- Better quality of research and improved outcomes – thanks to increased patient engagement, adherence, and accessibility – will accelerate R&D innovation, thus driving access to new diagnostics and treatments.

Guidance

- Forging strategic partnerships within the broader health ecosystem is essential to harness the potential of device-generated RWD.
- Life sciences organizations must establish robust data integration strategies and invest in comprehensive digital platforms capable of assimilating data from diverse sources.

Prediction 5: Fueled by Connected Health Devices and AI-Based Analysis Tools, the Market for Digital Biomarkers Will Double by the End of 2026, Lowering Healthcare Costs While Aiding in R&D and Outcome Measurements

Digital biomarkers are consumer-generated physiological or behavioral patient data collected through connected digital tools (portables, wearables, implantables, digestibles, etc.) that operate without interfering with a patient's daily lifestyle. This data is used for monitoring patients' health, both in clinical trials and in therapeutic settings. Digital biomarkers' value proposition lies in their ability to gather valuable insights from real-world data in home settings, generating important new endpoints without increasing patient burden. Unlike traditional biomarkers, digital biomarkers allow for the real-time monitoring of physiological or behavioral patient data. This becomes extremely important in predicting trends and preempting undesirable outcomes. The validation and the verification of the digital devices for specific disease areas and populations, the validation of the algorithms, and the

selection of the endpoints can be challenging. Data collected from patients for the treatment of chronic diseases — including diabetes, cardiovascular disease, neurological disorders, psychiatric disorders, and other conditions — is growing rapidly in volume and scope. The COVID-19 pandemic further highlighted the role and value of remote healthcare and data collection.

Applying new analytic tools, such as AI, for studying these often-large data sets will help life sciences companies and healthcare providers target promising areas for new therapies and monitor existing therapies for effectiveness when combined with other data such as motion, weight, nutrition, comorbidity, and drug interactions. This integrated data will help improve therapies for even micro-populations and will assist in setting outcome-based values for medicines and devices in real-world settings. Digital biomarkers also play an important role in determining the patient's current stage on the disease continuum and in recruiting patients for clinical trials. IDC estimates that the market for digital biomarker sensors, software, and analysis tools will grow rapidly in the foreseeable future.

Associated Drivers

- **AI everywhere —** Generative AI takes the spotlight
- **Shifting tech regulatory landscape —** Navigating risk and opportunity
- **The digital business imperative —** Competitiveness and outcomes

IT Impact

- Ensure that patient and provider privacy is built into all data collection and analysis tools.
- Move to cloud-based networks to enable collaboration with patient groups and partners, and capture digital biomarker data anytime, anywhere.
- Enable data interoperability that is in compliance with the FDA's Technology Modernization Action Plan (TMAP) and Data Standards Program Action Plan (DSPAP)

Patient Impact

- Improved patient engagement and medication adherence, resulting from the real-time patient monitoring and proactive measures by responding to signals from digital biomarkers, lead to improved health outcomes.
- Remote monitoring/reporting reduces the need for clinical trial visits and therapeutic office visits.
- Better access to copay and other patient assistance schemes as data is generated can help establish that the drug is working.

Guidance

- Build employee skills for real-time analytics and insights, leveraging AI.
- Collaborate with trusted provider and payer organizations.
- Use digital biomarker data to interpret patient journeys ethically and accurately.

Prediction 6: By 2026, the Adoption of GenAI-Based Drug Design, the Intelligent Supply Chain for Cell and Gene Therapies, and Digital Therapeutics Will Scale the Growth of Precision Therapies by 60%

Life sciences organizations are increasingly focusing on precision therapies, driven by the need for personalization and outcome-based treatment management. Digital transformation plays a vital role in deploying precision therapies, powered by data analytics and AI. About half of the life sciences industry is prioritizing increased investments in DX, and one-fourth is planning to leverage GenAI tools in its DX initiatives, as per IDC's May 2023 *Life Sciences Digital Transformation Survey*. The focus on precision therapies will draw increased adoption of GenAI-based drug design, the intelligent supply chain for cell

and gene therapies (CGTs), and digital therapeutics (DTx). GenAI-based drug design has far-reaching potential in target identification and precision medicine, establishing a new relationship between AI and drug discovery. CGT is accelerating precision medicine, focusing on chronic illnesses, rare diseases, and cancer. Key challenges include obstacles to the supply chain (particularly for personalized treatments) and the complexity of effectively aligning therapies with the appropriate patient characteristics. There is significant activity in the industry to build intelligent CGT supply chain solutions to enable cryopreservation, seamless cold chain, and product track and trace.

As per the Global Burden of Diseases (GBD) study, chronic diseases will contribute to 84% of global mortality by 2030. DTx create multiple touch points along a patient's journey and plays a vital role in managing these conditions. DTx monitor a patient's health and medication adherence, provide personalized coaching, and generate real-time tailored health recommendations. As per IDC's 2023 *Life Sciences Digital Transformation Survey,* 41% of LS firms are open to collaborating for the development of prescription digital therapeutics (PDTx), while 44% will build capabilities internally. IDC believes that the focus on personalization and outcome-based therapies will fuel 60% growth of precision therapies by 2026.

Associated Drivers

- **AI everywhere –** Generative AI takes the spotlight
- **The digital business imperative –** Competitiveness and outcomes
- **Shifting tech regulatory landscape –** Navigating risk and opportunity

IT Impact

- IT should upskill its frontline workforce, as LS firms are developing in-house skills for drug discovery and PDTx.
- IT and LOB should collaborate to drive tech provider engagement and improve outcomes.
- Investments in digital infrastructure should be increased to build a cloud-first approach and to modernize IT architecture.

Patient Impact

- PDTx will ensure seamless personalized therapies that enhance the patient's experience.
- Improved treatment outcomes will motivate patients to better adhere to their therapies.
- Extraction and usage of genomic information, in addition to digital biomarkers by digital therapeutics, would cause data privacy and security concerns for patients.

Guidance

- Drive engagement, transparency, and inclusivity across the frontline workforce and patients.
- Define and prioritize use cases related to precision therapies. Adopt digital-by-design strategy, embed digitalization at the grassroots level, and strengthen digital infrastructure.

Prediction 7: Despite the Decreasing Field Sales Head Count, GenAI Enhancements in Commercial Life Sciences Software Will Lead the Industry to a 40% Rise in Personalized Engagements with Healthcare Providers by 2027

Access to prescribers by field sales representatives in life sciences is decreasing steadily. In 2023, less than half of prescribing physicians in the United States allow personal visits by pharmaceutical reps, especially as HCOs including physician groups and hospitals are consolidating. Leading life sciences companies are intensifying efforts to transform HCP communication through new digital channels. Pharmas have undertaken bold steps to better understand HCPs' preferred channels and

the effectiveness of different messages and information provided to them by using analytics. Many companies have augmented their CRM with software that can generate recommendations for sending content or other next best actions to field representatives, marketers, or medical reps.

As commercial applications for generative AI have come into use recently, commercial teams at pharmaceutical, biotech, and medical device firms have begun to explore its use in tasks such as chatbot communications, market research, training, and the construction of HCP and patient journeys. The regulated and supervised use of generative AI offers the prospect of virtually unlimited customization for many general and specialized HCPs and HCOs, including those specializing in rare diseases and cell and gene therapies. IDC predicts that the next few years, the adoption of GenAI tools at life sciences companies will significantly increase the number of personalized and highly relevant engagements with HCPs, allowing these companies to increase their effectiveness and business value, even as the overall number of field representatives continues to decrease.

Associated Drivers

- **AI everywhere —** Generative AI takes the spotlight
- **The drive to automate —** Maximizing efficiency and new opportunities
- **The digital business imperative —** Competitiveness and outcomes

IT Impact

- Build the technology play that complements in-person interactions with digital interactions, enabling a "hybrid" sales force.
- Ensure regulatory compliance, data sovereignty, and ownership compliance.
- Construct and prioritize digital channels.

Patient Impact

- Increased awareness of innovative therapies by HCPs will lead to more effective treatment.
- Patients may benefit from copays and other financial assistance.
- Patient access and formulary access will increase.

Guidance

- Assemble groups of low-risk, repetitive tasks that can be tackled first, assisting field reps.
- Involve commercial teams early to understand where large efficiencies can be gained quickly.
- Build regulatory compliance and reporting into GenAI processes based on information access and report distribution, especially public versus proprietary data and the privacy of patients and HCPs.

Prediction 8: Evolving Home Care Initiatives and Patient Expectations Will Triple the Use of Intelligent Device–Based Drug Delivery Systems by 2027, Followed by Vectorized Antibodies and Gene Delivery Nanocarriers

The growing global burden of chronic diseases such as diabetes, COPD, cardiovascular diseases, and cancer has created a pressing need for innovative models of care delivery and medication administration. Also, the COVID-19 pandemic, along with other communicable disease challenges, disrupted care for chronic diseases and further accelerated the trend. The pandemic also expedited the shift toward home care initiatives, driving demand for drug delivery systems suitable for home settings while catering to patient expectations for safe, convenient, and personalized care. This heightened the focus on tech-enabled drug delivery systems to improve care convenience and safety,

particularly for self-administered therapies. IoT-enabled drug delivery devices such as smart injectors, connected inhalers, and integrated drug/device combinations are gaining widespread use. By harnessing AI and integrations with various biosensors, digital services, and apps, these devices are evolving into intelligent systems that bring together remote monitoring, drug delivery, adherence tracking, digital therapeutics, and patient engagement capabilities. The efforts are advancing rapidly in the field of diabetes care, with innovative pharmas, medical device manufacturers, and tech start-ups intensifying collaborations to create integrated closed-loop systems for automated insulin delivery.

Furthermore, the multiplied burden of communicable and noncommunicable diseases is driving advancements in vectorized antibodies and gene delivery nanocarriers in the pursuit of precision therapies with higher efficacy and minimized side effects. Owing to high-target specificity, these technologies show great promise, especially for treating oncological, neurological, and infectious diseases. With patient safety being among the top digital investment drivers (according to IDC's May 2023 *Life Sciences Digital Transformation Survey*), the industry is increasingly moving away from conventional to intelligent drug delivery approaches.

Associated Drivers

- **AI everywhere —** Generative AI takes the spotlight
- **The drive to automate —** Maximizing efficiency and new opportunities
- **Shifting tech regulatory landscape —** Navigating risk and opportunity

IT Impact

- The heightened need for interoperability will enable critical software and device integrations.
- Organizations should increase investments in AI and advanced security capabilities.
- Automated drug delivery systems must be complemented by robust safety monitoring.

Patient Impact

- Intelligent drug delivery systems significantly contribute to clinical outcomes and quality of life.
- Patients will have better and more convenient access to life-saving treatments.
- Unmet medical needs will be addressed, and the self-management of diseases will improve.

Guidance

- Prioritize safety and security, particularly in the case of automated drug delivery systems.
- Invest in capabilities to enable R&D collaboration with a broad ecosystem of partners.
- Forge partnerships with innovative vendors and tech start-ups to bring together technology and life sciences expertise, including security and integration capabilities.

Prediction 9: By 2027, One-Fourth of the Life Sciences Industry Will Supplement But Not Replace Animal Testing with Computer Simulations, Organoids, and Organ on a Chip, Prioritizing Neurological Diseases

Driven by a push from animal welfare associations to move away from animal testing in research, regulatory agencies are following the reduction, refinement, and replacement (3Rs) principles for the use of animals in research. In 2021, the EU passed a resolution facilitating the transition to nonanimal technologies in research. The FDA Modernization Act 2.0 (established in December 2022) allows researchers to use alternative methods to test the safety and efficacy of drugs. Countries such as India, South Korea, and Canada are also moving in this direction. This has triggered the growth of start-ups that are developing strategies such as computer simulations, organoids, and OOAC. The

FDA, under the Animal Generative Adversarial Network (AnimalGAN) Initiative is exploring an AI-based GAN architecture to learn from existing animal studies without conducting additional animal experiments. Organoids, which are self-organized 3D tissue derived from stem cells, mimic the functional, structural, and biological complexity of organs. 3D printers can produce organoids at scale. OOAC contains engineered or natural miniature tissues grown inside microfluidic chips. Multiple OOACs, emulating complex organ-to-organ interactions, allow for a more systematic study of drug metabolism and pharmacokinetics.

Despite a lot of skepticism, computer simulations have even outperformed animal models. Oxford University researchers demonstrated 89–96% accuracy in detecting adverse effects for a cardiac drug in a virtual human model. Computer simulations can be adjusted to represent diverse patients for understanding variations in responses, and they can replace animal models in indications such as neurological diseases for which animal models aren't as effective. They can also assess liver toxicity more effectively than animal models can. Yet these models have their limitations. OOACs are not ideal for testing low molecular weight drugs, which tend to absorb into the rubber polymer channels of chips, thus lowering the drug concentration to which the cells are exposed. Niche expertise and special instrumentation are required for conducting these experiments. These methods are better at predicting simple, short-term outcomes such as acute toxicity. Organoids and OOACs do not represent the complexity of the entire human system. Hence these technologies should supplement but not replace animal testing.

Associated Drivers

- **AI everywhere —** Generative AI takes the spotlight
- **Dynamic work and skills requirements —** New work mode era
- **Shifting tech regulatory landscape —** Navigating risk and opportunity

IT Impact

- IT will need to partner with business to define solutions for specific therapeutic indications.
- IT should build internal digital skills and must also partner with niche external vendors.
- IT must invest in and should assess organizational readiness, as this is a very new space.

Patient Impact

- Patients' concerns regarding the absence of animal testing must be addressed through change management initiatives.
- These technologies will be adopted where animal models fail and will scale access to care.

Guidance

- Carefully validate these solutions with animal testing before adopting them.
- Implement internal and external change management strategies to drive adoption.

Prediction 10: Approvals for Clinical Trials Focused on a Brain-Computer Interface Will Double by 2028, Prioritizing Neurorehabilitation While Implementing Strict Guardrails to Ensure Data Privacy and Patient Safety

Mind-reading devices are becoming a reality. A brain-computer interface enables neuromodulation via direct communication between the brain and external devices, and it can play a crucial role in restoring abilities in patients with neurological and neurodevelopmental disorders. Invasive BCI requires implantation of sensors (electrodes) into the brain, yielding high-resolution neural signals. It requires complex surgery, presenting risks of serious complications such as infection risks and the risks

associated with the long-term stability and biocompatibility of these devices. Noninvasive BCIs use methods such as electroencephalography (EEG), magnetoencephalography (MEG), and functional near-infrared spectroscopy (fNIRS). They are less risky, easier to use, and less expensive, but because of lower signal resolution, the communication between the brain and the interface is less accurate. Invasive BCIs enable computer control through thought, promising enhanced autonomy for those with communication or mobility impairments.

Yet ensuring long-term safety remains uncertain. Further, determining liability, whether surgeon or manufacturer, poses challenges. FDA guidelines on implanted BCIs have emerged, while ongoing trials assess their long-term safety and efficacy. The BrainGate trial, which is the longest U.S. study (2004-2021) of an implanted BCI on adults with limb weakness, noted no device removals due to safety. Well-funded start-ups are creating brain-computer interfaces for controlling robotic limbs. Endovascular BCI, as seen in the SWITCH trial, has proven to be safe and effective. BCIs integrated with VR headsets are aiding patient recovery. Stanford has used BCI to enable speech synthesis at 62 words per minute. Regulators and the industry are striving to develop safe BCI technologies. IDC predicts that approvals for BCI-focused clinical trials will double by 2028, prioritizing neurorehabilitation while implementing strict guardrails to ensure data privacy and patient safety.

Associated Drivers

- **AI everywhere —** Generative AI takes the spotlight
- **Cybersecurity and risk —** Building resilience against multiplying threats
- **Shifting tech regulatory landscape —** Navigating risk and opportunity

IT Impact

- Data privacy and security are significant concerns that need to be addressed.
- Extensive internal upskilling and partnerships with niche vendors are required.
- Software must be developed to manage massive data flows and enable real-time signal detection.

Patient Impact

- Patients must be made aware of the BCI risks and benefits to overcome barriers to adoption.
- BCI can improve the quality of life of patients, restoring independence and quality of life.

Guidance

- Given that neuromodulation with BCI offers both high opportunity and high risk, implement the necessary guardrails to address critical concerns regarding patient safety and data security and privacy.
- Develop portable devices that are easier to use and accessible to people with disabilities.
- Develop solutions that enable bidirectional communication, allowing people to not only control devices with their thoughts but also receive real-time feedback on their brain activity.

ADVICE FOR TECHNOLOGY BUYERS

As the life sciences industry is learning to grapple with wave after wave of disruptions, it has prioritized digital resiliency and slow but steady sustainable growth. Yet it seeks out that magic wand to power disruptive innovation and accelerate growth exponentially. While there is no such magic wand, generative AI is the next best thing. An industry that has been traditionally risk-averse is taking the

plunge head-on. It is working on developing frameworks to prioritize use cases, building governance models for enterprisewide implementation strategies, and outlining key performance indicators (KPIs) to measure ROI on investment. Yet it is seeking guidance from its technology partners to not only help it with all of the above but also establish the necessary guardrails to ensure the responsible and ethical use of AI, prioritize patient safety, and ensure data security and privacy. Technology will transform the life sciences industry like never before, and the industry needs to take measures to be ready for this change.

IT executives at life sciences organizations must take into consideration the following while developing their strategic road map:

- **Run with the wind.** This is not the time to be a fast follower when it comes to technology adoption. This is the time to adopt, adapt, and accelerate. More than 90% of the life sciences industry sees digital transformation as a top priority, and spending on digital transformation continues to grow. Half of the life sciences industry is increasing its spending by 10-20%, and over 10% of the industry will increase its spending by over 20% (source: IDC's *Life Sciences Digital Transformation Survey,* May 2023).
- **Invest aggressively in generative AI but implement guardrails.** Generative AI is not the future; it is rapidly becoming the present as the rate of adoption across the globe is growing exponentially. Partake wholeheartedly in the "intelligence revolution." Keep in mind, however, that not all use cases call for generative AI. Note that while 60% of the life sciences industry is investing 25-50% of its AI budget on generative AI, a third of the industry is still investing the same amount on interpretive AI and a fifth is investing 50-75% of its AI budget on predictive AI. Hence ensure that you identify use cases where the application of generative AI will be meaningful. Identify low-hanging fruit and demonstrate success to drive adoption within the organization while ensuring that you do have the necessary guardrails in place. There can be no mistakes when dealing with patients' data and patients' lives.

  The acquisition of large domain-specific data sets to train LLMs is essential, as model validation is key. Organizations must implement model scorecards that monitor bias creep and model decay and that trigger a model shutdown when needed. Remember that even one small failure impacting a patient's life can be far more damaging to a company's reputation than multiple large successes. So tread very carefully.
- **Choose your GenAI technology partners wisely.** The two most important factors when evaluating potential GenAI technology partners for the life sciences industry are the protection of clients' IP and data (44%) and the trustworthiness of the provider's own IP and data (37%) (source: IDC's *Future Enterprise Resiliency and Spending Survey, Wave 5*, June 2023). For the research- and innovation-focused life sciences industry, IP is everything. Yet, as per IDC's June 2022 *Future of Industry Ecosystems Survey,* data sharing is more prevalent among life sciences industry ecosystem partners than in most other industries. While it has become evident that there is a need to collaborate to innovate, ensure that you have robust data-sharing policies in place. Partners that enable secure data sharing will be partners of choice.
- **Play it safe.** Partner with cloud providers that have established trust centers of excellence, with expertise in ensuring data security, privacy, and regulatory compliance. Implement a zero trust policy and the right cybersecurity culture across the enterprise. Notably, more than half of the life sciences industry believe that cybersecurity and compliance is the IT area where generative AI will have the most positive impact in the next 18 months (source: IDC's *Future Enterprise Resiliency and Spending Survey, Wave 5,* June 2023).
- **Stay data hungry, stay data driven.** Note that the lack of availability of quality data is the third biggest barrier for the use of generative AI for the life sciences industry (source: IDC's *Future Enterprise Resiliency and Spending Survey, Wave 6,* July 2023). It is raining data on the life

sciences industry. Data volumes are exploding, and companies must focus on collecting only those data points that truly add value. It is critical for the life sciences industry to reinvent data strategies and governance models to transition organizations from data rich to data driven.

- **Build intelligent supply chains**. The top DX use case for the life sciences commercial sector is intelligent supply chain (source: IDC's Life Sciences Digital Transformation Survey, May 2023). With the growing importance of cell and gene therapies, CGT-focused supply chain solutions are being developed, which not only offer control towers and provide cold chain monitoring but also align to the need to adapt to an n-of-1 model, instead of addressing the needs of the masses. As per IDC's July 2023 *Future Enterprise Resiliency and Spending Survey, Wave 6,* 100% of the life sciences industry has considered improving supply chain efficiency to be an industry ecosystems initiative where companies see the maximum use of AI (source: IDC's *Future Enterprise Resiliency and Spending Survey Wave 6,* July 2023).
- **Grow dual but integrated expertise. Remember, it takes two to tango.** Work with technology providers that have established two parallel lines of expertise: domain and technology. One without the other doesn't work. This is even more relevant when engaging with TechBios leveraging GenAI strategies, since deep scientific expertise needs to complement core GenAI implementation expertise to build trust in the life sciences industry.
- **Connect the dots**. In a decentralized clinical trial world, where patients are increasingly remote, leverage the IoT to connect medical devices and health data platforms and create integrated patient journeys. Build a 360-degree view of patients to develop personalized recommendations and focus on improved outcomes.
- **Develop hyper-personalized recommendation engines**. Leverage generative AI to generate intelligent summaries of data across structured and unstructured data sources. Use this to move the needle and build truly personalized experiences for both patients and providers. Enhance patient engagement and optimize healthcare provider outreach.
- **Communicate, educate, and architect.** High concerns prevail, regarding not only the availability of internal skills to leverage generative AI effectively but also the fact that a significant percentage of the workforce is very concerned about losing their jobs. Hence it is important to redesign organizations and roles, communicate this change, and help employees move into new roles.
- **Be seen as an organization that acts "responsibly" and "ethically."** The life sciences industry is facing a trust crisis fueled by the distrust in the COVID-19 vaccines and patients' concerns regarding the security of their data. Implement IDC's Trust Framework, working across the four layers of trust implementation — namely, foundational, compulsory, strategic, and actualized trust — and invest in sustainability-by-design strategies. While the lack of ability to conduct third-party audits and in-person audits in a multitenant environment remains a key concern, the life sciences industry found that good governance, best practices, accountability, and responsibility are the biggest strength of its cloud providers (source: IDC's *Future of Trust Survey,* January 2022). Focus on embedding KPIs on the environmental, sustainability, and social impacts in these partnerships, and transition to a more outcome-driven and strategic level of IDC's Trust Framework. Ensure that you rank high on IDC's Trust Perception Index, based on security, compliance, privacy, and environmental, social, and governance (ESG). Remember, investors, patients and even employees are looking to work with socially responsible and ethical organizations.

EXTERNAL DRIVERS: DETAIL

AI Everywhere — Generative AI Takes the Spotlight

- **Description:** With intelligence becoming the primary source of value creation, we are on the verge of the "Intelligence Revolution," in which AI and automation-oriented technology will be the main accelerators of business change. In the realm of "AI everywhere," GenAI emerges as a transformative force, potentially revolutionizing the future. This branch of artificial intelligence enables a machine-driven autonomous creation of new content, from images to music to even written text, with remarkable accuracy. Early applications of GenAI have showcased its potential in fields such as creative arts, content and code generation, and personalized recommendations. However, it also raises concerns regarding bias and privacy: AI algorithms can inadvertently perpetuate biases and pose threats to personal data. As a result, regulation becomes crucial to ensure responsible and ethical use of GenAI. Despite these challenges, the possibilities are vast, ranging from improved customer experiences (CXs) to innovative problem solving. Harnessing the power of GenAI and navigating its associated complexities have the potential to shape the future of industries and drive advancements in the AI-driven world.
- **Context:** Businesses are already jumping to get a piece of the AI pie, afraid to miss out on the opportunities it presents. Although we are in the early days, monetization and scale of AI solutions are expected to evolve rapidly. However, this comes during a time of relative economic uncertainty and increasingly constrained IT budgets. Furthermore, AI is not without risks, especially when it comes to ethical AI and data privacy, and companies need to carefully consider the best use cases in order to implement AI effectively.

The Drive to Automate — Maximizing Efficiency and New Opportunities

- **Description:** Broader automation use cases – beyond just generative AI – are now ubiquitous. Now that data is embedded in the core of strategic capability for every organization, automation is critical to scaling a digital business and is evident in three domains: IT automation, process automation, and value stream automation – leading to autonomous operations, digital value engineering, and innovation velocity. Industrial organizations have spent the past few years evolving toward the Fourth Industrial Revolution (Industry 4.0) through the use of industrial automation and intelligence. Thoughtful implementation is more important than ever as data becomes embedded in the strategic core of every organization. Automation technologies such as robots and drones are being used increasingly in the military and healthcare sectors. Given this boost in automation, data is increasingly precious, and privacy must be prioritized and security enhanced. In some cases, automation has also led to concerns over the future of work – whether it will enhance or take away.
- **Context:** Businesses are rethinking how to employ automation to maximize operational efficiency – from automating assembly in manufacturing to identifying opportunities for food waste reduction in hospitality to improving customer experience in digital banking. IT will need to continue to assess new technologies and approach automation investments strategically, both within the walls of the organization and in the field. Among industrial organizations, IT/OT convergence will necessitate shared responsibility across teams for automation priorities and implementations.

Cybersecurity and Risk — Building Resilience Against Multiplying Threats

- **Description:** The era of digital business has resulted in a significant increase in the interconnectedness of devices, people, applications, data, and networks alongside movement of workloads to the cloud. However, this progress has led to a broader vulnerability to

cyberattacks. Ransomware attacks have multiplied exponentially, the dark web is teeming with low-cost, high-quality hacking services, and generative AI is threatening with more believable, humanlike phishing and pretexting attempts. A shortage of skilled cybersecurity professionals presents a continuous challenge for organizations to respond effectively. Cyberattacks have impacted all types of organizations, from governments to universities to businesses, and are oftentimes entangled in geopolitical motives. The increase in high-profile data breaches is furthermore leading to increased policy interventions regarding privacy and sovereignty.

- **Context:** An organization that is unprepared for cyberattacks may suffer various consequences, including data loss, financial implications, harm to the organization's brand reputation, decreased employee morale, and loss of customers. Cyber-resilience — the ability of an organization to anticipate, withstand, recover from, and adapt to any threats to its resources — is key for an organization to not only defend against cyberattacks but also prepare for swift response and recovery to attacks.

The Digital Business Imperative — Competitiveness and Outcomes

- **Description:** A digital business sees value creation based on the use of digital technologies for both internal and external processes, including customer engagement, employee experience, and product and services development. Building and leading a digital business is imperative for organizations to be competitive. While certain operational aspects may always have a nondigital component, digital businesses prioritize a digital-first strategy that aligns all parts of the business and IT landscape with digital workflows to drive value and growth. The development strategies for both digital and nondigital assets now require leveraging multiple channels for the digital business to obtain support or funding. This places a strong emphasis on providing digital experiences for customers and citizens, employees, and partners and necessitates a shift toward fully digital operating models and resilient supply structures enabled by digital technology. The focus of a digital business is increasingly on delivering measurable outcomes. Businesses that have recognized the value of digital anticipate maintaining or even increasing their investment in technology, even in times of economic uncertainty.
- **Context:** As more and more enterprises embrace digital strategies and technology, they prioritize technology investments that drive innovation or allow for competitive differentiation. Technology is no longer viewed as a tool to keep the business running, but it is the foundation for building new revenue-generating experiences and products. Laggards will need to adapt quickly and develop their digital road maps and embrace a digital business platform. Identifying top digital revenue opportunities that deliver value will be crucial for overall business success and implementation of organizational digital-first strategies.

Dynamic Work and Skills Requirements — New Work Mode Era

- **Description:** In the wake of COVID-19 pandemic–driven accelerated work transformation, enterprises continue to face dynamic work conditions. These range from lack of skilled employees to codifying more flexible ways of working that rely on a broad range of technologies and services. In some regions, most notably in Asia/Pacific, organizations are focused on building more secure and technically sophisticated office environments. In North America, remote and more flexible work models are driving investments in technologies that support collaboration across and within disparate work environments. Across this spectrum of work models, organizations are investing in infrastructure, hardware, software, and services to enable and manage increasingly automated ways of working. These include automated remote onboarding, learning in the flow of work, and use of AI and generative AI to facilitate basic tasks and workflows. While the pandemic drew much needed attention to the employee experience, enterprises have shifted to aligning employee requirements more plainly to

strategic business goals. The key challenge around the globe has been to find or upskill/cross-skill employees to scale and meet the demands of complex, automated work processes. Flexible work models continue to change to become even more agile, with digital workspaces highlighting skills, workforce management, automation, changing demographics, and as-a-service talent resourcing.

- **Context:** New modes of working are now intrinsic to leadership and organizational resilience and go well beyond traditional staff planning methods. They are also having an impact on frontline workers who have historically been neglected in favor of higher-paid front- and back-office peers. New work models require agile cross-functional teams — including HR, IT, LOB, finance, facilities management, and operations — to engage top talent and meet client brand expectations. While headlines debate the fate of environmental, social, and corporate governance initiatives, it's clear that environmental concerns will be an embedded element of workplace design and implementation of flexible work models. C-suite leaders and their teams must collaborate to recalibrate work culture, augmentation, and space/place planning to enable more secure, dynamic, and refined work models of the future.

Shifting Tech Regulatory Landscape — Navigating Risk and Opportunity

- **Description:** With frontier technologies like generative AI, geopolitical concerns, and cyber-risks, the tech legal landscape is rapidly changing. While the GDPR in the EU is perhaps the most well known of privacy laws, other countries have enacted legislation to ensure that personal information is protected and ethically used, such as China's Personal Information Protection Law (PIPL) and Japan's Protection of Personal Information Act (APPI). Nations all over the world are considering frameworks to regulate AI, including the EU's AI Act and the United States' AI Bill of Rights. Cybersecurity is top of mind with the United States' CIRCIA Act, Japan's Basic Act on Cybersecurity, and the EU's Cybersecurity Act. And with ongoing chip wars, countries around the world have mandated domestic production for certain parts of semiconductor manufacturing and banned foreign-created semiconductors in some cases — often along geopolitical lines. Tech regulation, however, is not just a blockade but presents an equal amount of opportunity as well. The afore-mentioned chip laws also incentivize domestic production and innovative chip manufacturing through tax subsidies. Other strategies such as electric vehicle subsidies are accelerating the green transition across many nations. And larger industry verticals are receiving big boosts, such as Saudi Arabia's investments in healthcare technologies.
- **Context:** Businesses must navigate an increasing number of regulatory rules. Even if it's not always the primary focus, tech is often a crucial part of these regulations. Most of these rules are intended to hedge against risks, but some are entrenched in geopolitical divides, so those firms that stay ahead of the game and build upon resiliency will be best equipped to comply with these regulations. Moreover, regulations and policies are not just restraints — they are also often springboards for investment with many regulations proposing tax subsidies and other kinds of incentives.

LEARN MORE

Related Research

- *IDC PeerScape: Lessons Learned from Generative AI Implementation in Life Sciences and Healthcare* (IDC #US51205523, September 2023)
- *How TechBios and Biotechs are Leveraging Generative AI to Transform Drug Discovery* (IDC #US51207023, September 2023)

- *Critical External Drivers Shaping Global IT and Business Planning, 2024* (IDC #US51057623, September 2023)
- *IDC PlanScape: Developing Your Path to Impact with Generative AI* (IDC #US51157323, August 2023)
- *The Most Strategic Generative AI Technology Partners for the Life Science and Healthcare Industries* (IDC #US51184823, August 2023)
- *IDC Innovators: Remote Patient Engagement and Virtual Care Solutions, 2023* (IDC #US50132223, August 2023)
- *The Pulse of IT in the European Healthcare Market: Key Deals and Initiatives, April-June 2023* (IDC #EUR150131623, July 2023)
- *Life Sciences Digital Transformation Survey Including Key Use Cases of Generative AI in the Life Sciences Industry* (IDC #US50985623, June 2023)
- *New Era in Medical Devices Cybersecurity: Implications of the FDA's Latest Guidance Document for the Industry* (IDC #US50759823, June 2023)
- *IDC PlanScape: Remote Health Monitoring* (IDC #CA40161416, June 2023)
- *Worldwide Medical Devices Key IT Deals and Initiatives Update, Q1 2023* (IDC #US50132723, May 2023)
- *Generative AI for the Healthcare Industry: Opportunities, Challenges, Use Cases, and Expectations* (IDC #EUR150730623, May 2023)
- *The Future of Trust in Healthcare and Life Sciences* (IDC #US50619123, May 2023)
- *Impact of Generative AI on the Healthcare and Life Science Industries* (IDC #US50617123, May 2023)
- *Real-World Evidence, Social Determinants of Health, and Digital Biomarkers in Driving Patient Recruitment* (IDC #US50382823, March 2023)
- *Enabling Digital Ecosystems in European Life Sciences* (IDC #EUR147815021, March 2023)
- *Worldwide Medical Devices Policy and Regulatory Update, January 2023* (IDC #EUR249995623, January 2023)

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