

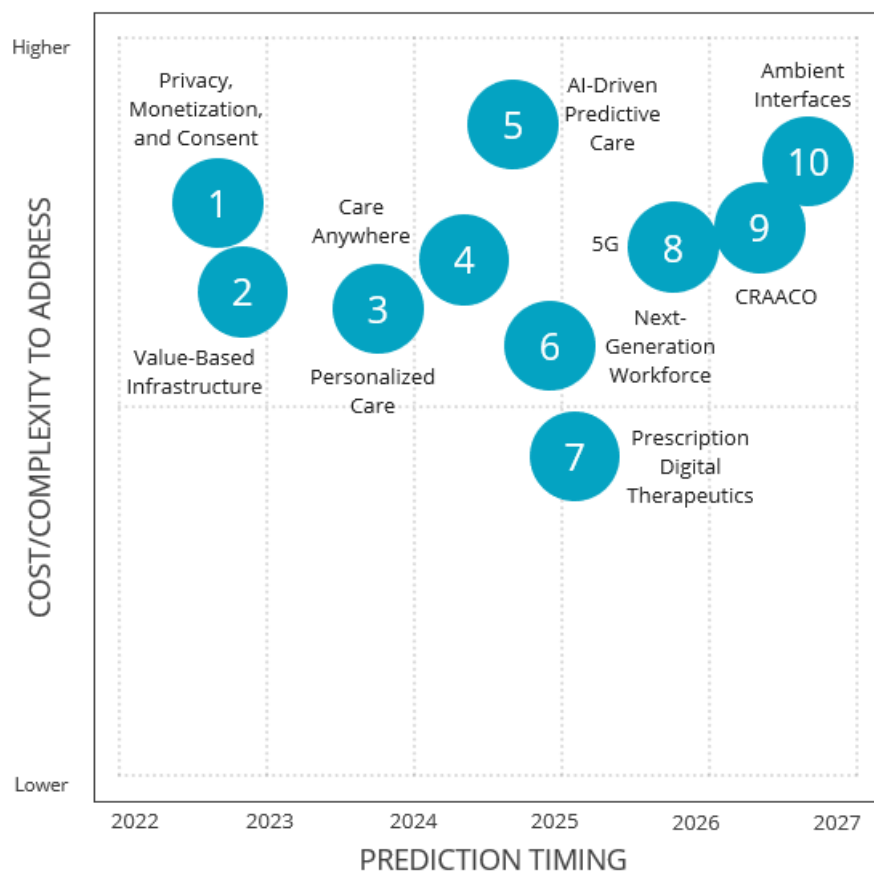
# IDC FutureScape: Worldwide Healthcare Industry 2022 Predictions

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## IDC FUTURESCAPE FIGURE

FIGURE 1

### IDC FutureScape: Worldwide Healthcare Industry 2022 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.

Source: IDC, 2021

## EXECUTIVE SUMMARY

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This IDC FutureScape provides executives across the globe with actionable insights and analysis for likely future healthcare industry scenarios. The intended readers include, but are not limited to, members of the business, clinical, and IT leadership of healthcare provider and payer organizations worldwide. The IDC FutureScape 2022 predictions suggest that in the next five years, healthcare organizations will focus on navigating the winds of change in a digital-first world.

Our worldwide health industry 2022 predictions are:

- **Prediction 1:** By 2023, multiple governments will tighten regulations regarding health data sharing, consent, and monetization after at least two overaggressive incidents exploiting interoperability
- **Prediction 2:** By 2023, 70% of healthcare organizations' attempts to scale value-based care models will fail unless they invest in data-driven governance, operations, and organizational infrastructure
- **Prediction 3:** By 2024, 30% of chronic care patients will truly own and openly leverage their personal health information to advocate for, secure, and realize better personalized care
- **Prediction 4:** Through 2024, growth in "care anywhere" programs will increase discontinuity of care and data fragmentation, resulting in a doubling of a patient's risk for adverse medical events
- **Prediction 5:** By 2025, 35% more providers will have adopted AI-driven solutions and algorithms to support predictive care models
- **Prediction 6:** By 2025, 50% of healthcare organizations will rely on hybrid workplaces and models to battle digital burnout, reframe workforce roles, and create seamless employee experiences
- **Prediction 7:** By 2025, the market for prescription digital therapeutics will more than triple, led by mental health and chronic conditions, blurring the boundaries between healthcare and life sciences
- **Prediction 8:** By 2026, two out of three hospitals will be 5G enabled to accelerate innovation in medical imaging, remote care, internet of medical things, and immersive services
- **Prediction 9:** Integrated research organizations will double in number by 2027, fueling the adoption of clinical research as a care option within the healthcare ecosystem
- **Prediction 10:** By 2027, ambient interfaces powered by intelligent speech recognition, sensors, and/or gesture-based controls will be used by 60% of healthcare professionals and 20% of households

This IDC study provides executives across the globe with actionable insights and analysis for likely future healthcare industry scenarios.

"The 2022 worldwide healthcare industry predictions focus on navigating the winds of change in a digital-first world," says Mutaz Shegawi, research director, IDC Health Insights. "Digital transformation (DX) is well underway in healthcare amid multiple industry headwinds, tailwinds, and crosswinds. Healthcare organizations will each interpret the world around them in different ways. With that, each organization will be unique in its determination of what technologies to adopt and capabilities to advance for it to improve processes, value, and innovation in the future of healthcare."

### Summary of External Drivers

- **Pervasive disruption continues** – Volatility, opportunity, and resilience
- **Cybersecurity and risk** – The threat environment just keeps scaling
- **Embracing digital first** – New strategies for complexity and ubiquity
- **Intelligence on demand** – Navigating the torrent of data
- **Digital ecosystem** – Thriving in a multiplatform world
- **Workforce outlook** – Redefining teams, reinventing models, and rethinking leadership
- **Engagement reimaged** – From responsive to anticipatory

These seven key drivers are discussed in more detail in the External Drivers: Detail section.

### Predictions: Impact on Technology Buyers

#### ***Prediction 1: By 2023, Multiple Governments Will Tighten Regulations Regarding Health Data Sharing, Consent, and Monetization After at Least Two Overaggressive Incidents Exploiting Interoperability***

Even though health and insurance entities are usually locally regulated, central government intervention will be necessary when interoperable health data is transmitted through new, more open, channels. Previously, health data communications were constrained to "hardwired" constructs such as health information exchanges and clearinghouses. Emerging interoperable approaches allowing vendors, devices, and third-party applications to access previously unshared personal health and insurance data will be exploited by mercenaries, criminals, and other companies. Some will be victimized via data breaches or cyberattacks. Others will overaggressively monetize or improperly identify "deidentified" data via artificial intelligence (AI).

In a unified worldwide response with actions that serve as significant enhancements to GDPR and HIPAA, laws will be enacted severely penalizing organizations that failed audits, were breached, and implicitly or explicitly charged patients for data access. Enforcement of these laws will move past CMS in the United States to include a newly formed U.S. CyberForce as a part of Homeland Security to ensure national and citizen health data security. European countries have already started to integrate regulation for health data sharing and storage to address data protection issues related to cloud-based digital healthcare ecosystems, with "data as a service" value propositions built on them.

Citizens will react by sporadically rejecting data sharing in the short term, but eventually, personal health data sharing applications will become as prevalent as mobile banking apps by the end of the decade, concurrent with an explosion of new grey areas on the lawful use of information and consent.

### Associated Drivers

- **Cybersecurity and risk** – The threat environment just keeps scaling
- **Embracing digital first** – New strategies for complexity and ubiquity
- **Digital ecosystem** – Thriving in a multiplatform world

### IT Impact

- New data liquidity offers opportunities to abuse regulatory frameworks and consent practices, mandating next-generation cybersecurity approaches.

- Growth of cloud-based digital health platforms and ecosystems exposes data further. Cloud and cybersecurity should be looked at in tandem, perhaps crossing IT departments.
- Industry ecosystems are now driven by the convergence of providers, payers, and pharmaceutical and medical technology companies. Ensure open architecture in your planning.

### Patient Impact

- Citizens demanding transparency on health data use will collide with privacy preferences.
- Health consumerism will drive the adoption of health and well-being applications and the collection of a broader range of health data (from wearables, mobile applications, and sensors) linked to traditional health data.

### Guidance

- Invest in multidimensional, multi-industry (payer, provider, and life sciences) data platforms and consent engines with ease of data ingestion and enterprise data management as drivers.
- Establish strong data governance, master data management approaches, and hold stewards accountable for data sharing.
- Monitor privacy, security, and data monetization regulations at a federal and local level.

### ***Prediction 2: By 2023, 70% of Healthcare Organizations' Attempts to Scale Value-Based Care Models Will Fail Unless They Invest in Data-Driven Governance, Operations, and Organizational Infrastructure***

For many healthcare organizations, value-based care has been viewed as a project or initiative and not strategic to growth and competitive advantage. As such, organizations have reacted tactically, investing in technology and human resources with a siloed, short-term approach. The concept of managing individuals as opposed to healthcare episodes is not shared within organizational culture, resulting in programs that do not scale and a lack of standards or metrics against which success can be measured. Value-based care programs cannot be sustained without creating an organizational infrastructure, and those programs with financial incentives will see providers face financial penalties.

A value-based care infrastructure includes technology, governance, operations, and an organizational model where all voices are represented. Healthcare organizations must establish an organizational structure that balances the need for standard approaches to value-based health while providing flexibility for regional and local requirements. Direct accountability needs to be established to guide both the care and financial incentives of value-based care. Establishing a value-based care organizational infrastructure is challenging and requires investment in staffing, technology, and change management. Without widespread acceptance of the vision and operational plan, healthcare organizations will not execute what is needed to become sustainable value-based care organizations.

### Associated Drivers

- **Intelligence on demand** – Navigating the torrent of data
- **Workforce outlook** – Redefining teams, reinventing models, and rethinking leadership

### IT Impact

- IT will have to provide access to timely, accurate, and complete data on patients for use by clinicians, data analysts, and data scientists.
- Strong data management and governance must be established.

## Patient Impact

- Complete, convenient, and consistent care will be available to patients encouraging their engagement and care plan adherence.
- Caregivers will have access to patient data in compliance with local privacy and security regulations when needed to improve treatment decisions.

## Guidance

- Invest in a data infrastructure that supports both business intelligence and artificial intelligence.
- Establish an organizational structure that combines enterprise and regional requirements.
- Engage physicians early in the process to generate awareness and buy-in for virtual care.
- Plan and manage the impact of change on the organization.

### ***Prediction 3: By 2024, 30% of Chronic Care Patients Will Truly Own and Openly Leverage Their Personal Health Information to Advocate for, Secure, and Realize Better Personalized Care***

According to the World Health Organization, many people who need treatment for chronic diseases (e.g., cancer, hypertension, cardiovascular diseases, respiratory diseases, and diabetes) have not received health services and medicines since the COVID-19 pandemic began. This finding is alarming, as almost 71% of all deaths worldwide occur due to chronic diseases. In line with the surge in the adoption of telehealth and connected health solutions, patient/consumer expectations and demands are set to be higher, especially for chronic disease management. 40.5% of healthcare organizations plan to increase spending on health IT with chronic care management transitioning from seasonal or episodic health monitoring to continuous vital monitoring through connected devices and wearables. IDC's 2021 *Future Enterprise Resiliency and Spending (FERS) Survey, Wave 4* showed that 57% of healthcare organizations planned to focus on IoT-based projects (e.g., remote monitoring and connected health) in 2021 compared with the previous year. Such connected care enables physicians to detect abnormalities earlier on and assess health conditions more holistically, while the digital front door plays a vital role as well by redefining the way care is accessed.

Evolving ecosystem models are driving connected disease management that is patient centric, with partners such as care providers, payers, cloud service providers, telecommunication, and health IT firms. IDC's 2021 *FERS Survey, Wave 2* showed that almost one-third of healthcare organizations are well aligned with their ecosystem, and a similar number (31.5%) are in the process of aligning with their ecosystem by expanding partnerships. IDC also estimates that nearly one out of three chronic care patients will be enabled by evolving ecosystems to serve as custodians of their own health data and to leverage it for more personalized care.

## Associated Drivers

- **Embracing digital first** – New strategies for complexity and ubiquity
- **Digital ecosystem** – Thriving in a multiplatform world
- **Engagement reimagined** – From responsive to anticipatory

## IT Impact

- Increased investment in cloud technologies to support applications and enable secure data sharing
- Need for open APIs to extend flexibility to multisided ecosystem partners

## Patient Impact

- By monitoring biometrics that are continual rather than seasonal or episodic, patients will play a more active role in managing their chronic conditions.
- There will be more flexibility to choose care providers when patients own their health data/information.

## Guidance

- Define chronic care use cases clearly, in a way that aligns with the formation of the respective patient-centric ecosystems and patient communities.
- Ensure close partnerships with key stakeholders defined by patient outcome-related KPIs.
- Assess patient experience with a focus on the user-friendliness of the application interface and data interoperability to drive long-term retention of chronic-care patients.

### ***Prediction 4: Through 2024, Growth in "Care Anywhere" Programs Will Increase Discontinuity of Care and Data Fragmentation, Resulting in a Doubling of a Patient's Risk for Adverse Medical Events***

Consumers' desire for more convenient access to cost-effective care and healthcare organizations' objectives to meet that demand are driving "care anywhere" initiatives. These initiatives range from care provided in nontraditional settings like retail clinics to remote health monitoring of patients with chronic and acute conditions and virtual care services that surged during the pandemic.

Offering convenient access to care supports an improved patient experience and reduces healthcare costs by providing care in less expensive care settings, including patients' homes. However, as patients seek uncoordinated care across various healthcare settings, there is an increased risk of discontinuity of care, data fragmentation, more data silos, and inaccurate quality reporting. Poor communication between care providers and limited access to patient information are major contributors to medical errors. In fact, the Joint Commission Sentinel Event database reveals that poor communication is the root cause in nearly 70% of reported sentinel events, which it defines as unexpected events involving death or serious physical or psychological injury, or risk thereof, not related to the natural course of the patient's illness. It has also been widely stated that 18% of medical errors are estimated to be due to inadequate availability of patient information. These care and data fragmentation challenges will double the risk of adverse medical events and medical errors. Stringent use of interoperability and data sharing agreements will help healthcare organizations overcome these challenges.

## Associated Drivers

- **Embracing digital first** – New strategies for complexity and ubiquity
- **Intelligence on demand** – Navigating the torrent of data
- **Engagement reimaged** – From responsive to anticipatory

## IT Impact

- IT will face increased pressure to invest in interoperability and health information exchange capabilities, connected health technologies, and reporting on challenging quality metrics.
- Reliable broadband connectivity will be essential to transmit healthcare information, including video and images between the patient's location and the provider's electronic health record (EHR).

- The need for data governance and management will escalate as data flow will need to be monitored for quality and compliance.

### Patient Impact

- Lack of complete patient information at the point of care will lead to medical errors and poor outcomes, increasing patients' risk of experiencing an adverse medical event.
- Incomplete patient information and siloed systems will frequently result in repeated diagnostic tests, which will delay diagnosis and treatment and increase costs and may adversely impact patient outcomes.
- The gap in digital literacy will increase health access inequalities and contribute to the risk of poor healthcare and care coordination inefficiency for populations in need.

### Guidance

- Centralize data management and work with the broader ecosystem of healthcare services providers to enable quality metrics documentation.
- Focus on improving interoperability, data integration, care coordination, and handoffs between teams and team members to mitigate the risks of adverse medical events.
- Ensure care access equality and inclusiveness by providing care models that are designed to support patients' digital literacy while responding to individual "care anywhere" needs.
- Educate patients and healthcare providers on the use of remote healthcare monitoring solutions.

### ***Prediction 5: By 2025, 35% More Providers Will Have Adopted AI-Driven Solutions and Algorithms to Support Predictive Care Models***

AI-driven solutions and algorithms hold much promise to support predictive care models. These models are starting to support everything from early disease detection to conversational AI chatbots (e.g., virtual triage, care automation, and symptom checkers) and advanced analytics in clinical decision support systems (CDSS), population health, medical imaging, and revenue cycle management (RCM). Predictive models are also used to support related areas such as prescription auditing, robot-assisted surgery, drug discovery, gene analysis, medical device studies, fraud detection, intelligent capacity planning, and supply chain management.

Predictive care models use patient data such as age, gender, social determinants of health, previous hospitalizations, ER visits, and other factors to help stratify patients at risk of developing a disease condition or being readmitted into a hospital. The abundance of data and the emergence of incentive programs present as tailwinds to drive predictive care models forward. Barriers to adoption include a relative lack of digital skills to develop these models in addition to their costs, regulations, and validity. This is in line with IDC's 2021 *Industry AI Path Survey* data, which showed that 65% of healthcare providers are using or plan to use external third-party vendors as their primary development approach for AI applications while 35% use in-house or off-the-shelf AI applications.

In the United States, hospital readmissions within 30 days of discharge already present a high cost (in the range of \$30 billion annually), making it a national healthcare priority and opportunity for predictive care to impact. Other governments are also prioritizing predictive care models to advance their healthcare systems. For example, the Singapore government developed a national AI strategy focusing on preventive care across the next 10 years. Furthermore, NHS Scotland's Scottish Patients at Risk of Readmission and Admission (SPARRA) model now produces a monthly score for approximately 80% of the population (about 3.6 million patients) to assess their risk of emergency



admission to a hospital across the upcoming 12-month period. This score is delivered automatically to practitioners to inform primary care strategies predictively. Thus IDC predicts that by 2025, over a third of hospitals worldwide will use predictive care models.

### Associated Drivers

- **Intelligence on demand** – Navigating the torrent of data
- **Engagement reimagined** – From responsive to anticipatory

### IT Impact

- AI-driven predictive care being data intensive will require scalable, high-performance infrastructure that can support unpredictable data growth alongside flexible data management. Also, data from multiple sources (e.g., EHRs and claims) such as the patient's history, medical conditions, and recent treatments will inform the models and determine their effectiveness.
- New approaches to dealing with data corruption and ransomware attacks will have to be established, while protecting patient privacy, to align with the heightened demand to comply with regulations like GDPR and HIPAA, impacting data security and privacy.

### Patient Impact

- Providers will have a better idea of potential reasons for readmission, enabling recommendations and preventive measures to be taken while the patient is still hospitalized.
- Over time, the data generated from such models can help decision makers plan for better long-term strategies to improve outcomes and care journeys and reduce readmissions.

### Guidance

- Identify what key insights or data is missing to improve outcomes and reduce readmissions.
- Build robust models through reliable data sources and advanced predictive visualizations.

### ***Prediction 6: By 2025, 50% of Healthcare Organizations Will Rely on Hybrid Workplaces and Models to Battle Digital Burnout, Reframe Workforce Roles, and Create Seamless Employee Experiences***

The accelerated global demand for healthcare services and the increasing rate of healthcare professional burnout are shaping a new workforce model for healthcare organizations. Technology opens up opportunities to improve the workforce experience by reducing the friction often found in healthcare workflows and processes. Interoperable, well-integrated, and highly available digital systems serve as allies for the health workforce by supporting daily tasks, streamlining IT silos, and generating value in the overall user experience. Systems that support workflow automation and integrate data across multiple workflows are increasingly being adopted to provide greater agility, efficiency, and organizational resiliency. However, data governance, identity management, and security need to be considered during this transition while expanding the boundaries of healthcare organizations.

This paradigm shift in the healthcare scenario reflects IDC's future of work framework. IDC defines the future of work as a fundamental change to the work model that fosters human-machine collaboration, enables new skills and worker experiences, and supports an intelligent and dynamic environment unbounded by time or physical space.

### Associated Drivers

- **Pervasive disruption continues** – Volatility, opportunity, and resilience



- **Workforce outlook** – Redefining teams, reinventing models, and rethinking leadership
- **Engagement reimaged** – From responsive to anticipatory

### IT Impact

- Data interoperability will increasingly be the cornerstone for creating an integrated and collaborative health system and optimizing clinical workflows.
- Remote and hybrid work models will require a governance framework around workforce's bring-your-own-device (BYOD) policies and extended organizational boundaries to promote better identity and access management, as well as data security.
- Automation, analytics, and AI solutions will be critical to streamline workflows and help reduce burnout.

### Patient Impact

- Reduced paperwork, more efficient processes, and greater digital skills will allow the workforce to dedicate more time to patients, positively impacting patients' experiences.
- Workforce ability to deliver "care anywhere" services (i.e., video consultations and instant messaging) will support a greater part of the population and their health needs, freeing up space for those who cannot rely on digital channels for their care.

### Guidance

- Ensure that the health workforce recognizes the added value of digital solutions, is trained on their use, and provides continuous feedback after implementation of the same.
- Accelerate data integration and access across multiple sources, extending the organizational boundaries beyond the enterprise walls without neglecting compliance and security priorities.

### ***Prediction 7: By 2025, the Market for Prescription Digital Therapeutics Will More Than Triple, Led by Mental Health and Chronic Conditions, Blurring the Boundaries Between Healthcare and Life Sciences***

Healthcare providers worldwide are striving to reimagine patient engagement models to better meet the expectations of today's digital "patient sapiens." These empowered patients of the new digital era expect more convenient, innovative, and personalized treatment options beyond traditional pharmacotherapy. At the frontiers of healthcare and life sciences, innovative tech-enabled treatment solutions based on software as an "active ingredient" have emerged. This new chapter in therapeutics, referred to as prescription digital therapeutics (PDTs), involves monotherapy or solutions combined with standard treatments. Despite some skepticism among clinicians, PDTs already gained traction before the pandemic to prevent, manage, or treat specific disorders. In many countries, conducive regulatory changes have been supporting the trend. For example, in 2019, Germany introduced a "Fast Track" for regulatory approval of digital health applications prescribed by physicians, reimbursed by the country's statutory health insurance.

The onset of the pandemic provided a whole new impetus for PDTs. PDTs offer new remote delivery options for evidence-based treatments for various chronic and mental health conditions. Key benefits include easing access to care and adding resilience to care delivery systems while improving patient-provider communication, patient self-management capabilities, and engagement in care processes. An improved patient experience is achieved by enhancing patients' choices, convenience, and clinical outcomes. Early last year, the U.S. FDA relaxed regulatory requirements to foster the use of digital health products for remote monitoring and management of behavioral issues to address the escalating mental health crisis in light of the pandemic. As COVID-19 continues to drive the shift toward digital

engagement channels, remote care options, and proactive care models, IDC expects the global market for PDTs to more than triple by 2025. PDTs will grow particularly fast to fight the "next pandemic" of mental disorders and chronic diseases, accelerated by the disruptions in chronic care and lifestyles during the global health crisis.

### Associated Drivers

- **Pervasive disruption continues** – Volatility, opportunity, and resilience
- **Embracing digital first** – New strategies for complexity and ubiquity
- **Engagement reimagined** – From responsive to anticipatory

### IT Impact

- There will be an enhanced focus on patient data governance and data privacy and security.
- A broader ecosystem of stakeholders, including payers, pharma and life science companies, technology partners, and patients will demand closer collaboration.

### Patient Impact

- Proactive engagement of patients in their care and improved self-management of diseases
- Improved convenience and access to care with improved clinical outcomes and experiences

### Guidance

- Study regulations, data protection rules, and reimbursement schemes related to PDTs.
- Build awareness, and skills, among patients and clinicians on digital therapies.

### ***Prediction 8: By 2026, Two Out of Three Hospitals Will Be 5G Enabled to Accelerate Innovation in Medical Imaging, Remote Care, Internet of Medical Things, and Immersive Services***

The expansion of 5G networks will deliver faster speeds, lower latency, and increase phone and IoT connection density. The resulting enhancements to telecom services will extend the reach of healthcare to remote and underserved areas, further benefiting telemedicine programs that connect rural hospitals with tertiary medical centers, for example. When combined with other technologies such as AR/VR, robotics, and AI, 5G will support new innovative services in healthcare and life sciences. As 5G becomes more widely available, providers are exploring and planning for how they will use it. According to IDC's July 2020 *Industry IT and Communications Survey*, 19.1% of providers classify their 5G activities as in the idea generation-only stage, 42% are in the initial planning stage, and 33.5% are in the development stage.

Early 5G use cases will focus on enhancing connected health technologies, specifically telehealth, virtual visits, and remote health monitoring. As 5G networks mature and integrate with other technologies, more sophisticated 5G use cases, such as remote robotic surgery, emergency medical services-based telemedicine, and AR/VR diagnostics, will deliver operational efficiencies, enhance medical training, and improve patient outcomes. There is a tremendous opportunity for 5G in healthcare, and IDC Health Insights predicts that in the next five years, two out of three hospitals will deploy a private 5G network that will serve as an innovative springboard for piloting new 5G use cases.

### Associated Drivers

- **Embracing digital first** – New strategies for complexity and ubiquity
- **Intelligence on demand** – Navigating the torrent of data

- **Engagement reimagined** – From responsive to anticipatory

## IT Impact

- There will be reduced telecommunications costs by eliminating redundant or inefficient systems, better aligning connectivity to use cases, and enabling more optimized connectivity pricing options.
- Seamless connectivity across the healthcare enterprise and for mobile healthcare resources such as emergency medical technicians that currently rely on land mobile radio systems that do not integrate with EHRs will grow.
- More robust security will be driven through dedicated business-only broadband connections; 5G's eventual networking slicing feature will offer additional means of isolating and securing sensitive data.
- The ability to better support large image file transfers, less latent virtual visits, and immersive AR/VR visualization environments will be developed.

## Patient Impact

- 5G benefits in the near term will be realized around operational efficiencies and improved telehealth experience by supporting higher-quality video and more consistent connectivity. Direct patient impact begins to scale in the three- to-five-year time frame.
- Enhanced diagnostic tools enabled by 5G will improve clinical decision making at the point of care, which will improve patient outcomes.
- 5G combined with other technologies will change the healthcare experience and provide new pathways for treatment.

## Guidance

- Know what you have and where the connectivity gaps are.
- Define or target clear goals/KPIs for 5G/mobility upon which to improve.
- Find a trusted advisor for connectivity and use case development.
- Adopt today but build for tomorrow.

## ***Prediction 9: Integrated Research Organizations Will Double in Number by 2027, Fueling the Adoption of Clinical Research as a Care Option Within the Healthcare Ecosystem***

Clinical research as a care option (CRAACO) provides clinical trial participation as a viable medical care option to eligible patients, with dual objectives of improving population health and accelerating clinical research. In a survey conducted by the Center for Information and Study on Clinical Research Participation (CISCRP) in 2017 on 12,427 individuals from 68 countries, it was found that 44.9% reported that clinical trials were rarely considered as an option when discussing treatment options with their physicians and 59% were not aware where studies were being conducted. In a survey conducted in May 2021 by the British National Institute for Health Research (NIHR), it was found that 78% of respondents think health research should be offered as part of NHS routine care. Yet only 13% of respondents reported that they were aware that opportunities to participate in research existed in every U.K. hospital. A lack of awareness of trials has resulted in less than 1% of the U.S. population and only a small percentage of the global population participating in clinical trials, despite a clear interest in the same.

With most physicians being employees of a healthcare system, the "systemization" of healthcare has created complexities, limiting their ability to participate in clinical trials as well. There is an urgent need

to not only increase awareness about clinical trials but provide patients with opportunities to participate in trials within the healthcare ecosystem itself. Integrated research organizations (IROs) are connecting the dots between healthcare and research, driving a systemic industry change, and aligning clinical trials with unmet patient needs and population health initiatives. This change will result in the doubling of IROs by 2027, fueling the adoption of CRAACO within the healthcare ecosystem.

### Associated Drivers

- **Pervasive disruption** – Volatility, opportunity, and resilience
- **Digital ecosystem** – Thriving in a multiplatform world
- **Engagement reimagined** – From responsive to anticipatory

### IT Impact

- There is an urgent need to establish data standards and drive interoperability.
- There will be a focus on data governance, data sharing, and data privacy.
- Digital ecosystems, integrated healthcare, and research workflows will be established.

### Patient Impact

- CRAACO will increase access to care, improve outcomes, and drive patient centricity.
- CRAACO will provide patients with treatment choices and make them feel empowered.

### Guidance

- Embed critical roles, streamline clinical workflows, and integrate clinical trials within healthcare ecosystems.
- Steer interoperability initiatives and design road maps to pull data directly from electronic health records and electronic data capture (EDC) systems to create a "source to submission" model.
- Establish data governance and data sharing models.
- Increase clinical trials awareness, drive not only a patient-centric but people-centric (including caregivers) focus, and increase patient and provider involvement.

### ***Prediction 10: By 2027, Ambient Interfaces Powered by Intelligent Speech Recognition, Sensors, and/or Gesture-Based Controls Will Be Used by 60% of Healthcare Professionals and 20% of Households***

The proliferation of connected devices, such as wearables and wireless sensors, is enhancing patient engagement and easing healthcare professional workload. Alongside them, intelligent speech recognition and gesture-based controls are progressively being adopted to speed up the workload of healthcare professionals. Ambient interfaces connect smart systems with human users, by making the physical spaces we inhabit sensitive and responsive to our presence. Ambient interfaces help bring healthcare to the homes of patients and enhance virtual care and preventive care. They are also used in hospital settings to improve both patient and healthcare professional experiences. For example, during the hospital stay, the integration of ambient interfaces and various connected technologies allows the patient to interact with hospital facilities and allows for remote monitoring in a natural and nonintrusive way.

To put this trend in numbers, IDC's 2021 *FERS Survey*, Wave 5 reveals that at least half of healthcare organizations will monitor and manage the majority of the installed devices, equipment, assets, facilities, and processes remotely over the next five years. Combining such systems with ambient interfaces will ensure more immersive and seamless interactions between patients and clinicians

through a real-time flow of information, context-aware automation, and improved patient experience, safety, and efficiency. This will fuel the adoption of ambient interfaces by 60% of healthcare professionals and 20% of households by 2027.

### Associated Drivers

- **Pervasive disruption continues** – Volatility, opportunity, and resilience
- **Embracing digital first** – New strategies for complexity and ubiquity
- **Engagement reimaged** – From responsive to anticipatory

### IT Impact

- Deep learning, machine learning (ML), and natural language processing-based technologies will be the key to unlock the insights of clinical data collected by ambient interface systems.
- Cybersecurity risks will be especially challenging. Enabling proper identity and access management and data security will be of paramount concern.

### Patient Impact

- The documentation burden for clinicians will be reduced, as a result of less manual documentation of medical visits, allowing doctors to pay full attention to patient care with a clear impact on the quality of care delivered.
- Ambient interfaces will act along the patient journey to improve their well-being from the treatment and monitoring stage to promote a healthy lifestyle.
- There will be a greater access to healthcare services, both in the hospital and at home, to a greater portion of patients by extending the usability of connected health technologies.

### Guidance

- Invest in data interoperability solutions to optimize the implementation of ambient intelligent interfaces. Ambient interface systems collect a vast amount of data, which can also serve for secondary use.
- Educate healthcare professionals to fully leverage ambient interface solutions for both operational and clinical processes.
- Promote ambient interface solutions as a driver for a better patient experience to enhance personalized medicine and help patients manage their own care.

## ADVICE FOR TECHNOLOGY BUYERS

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The world continues to evolve despite the disruption of the global economic and social climate by the ongoing COVID-19 pandemic. Healthcare organizations will try to align technology investments made during the initial pandemic wave (e.g., virtual care and intelligent capacity planning) with those that preceded them while continuing to organize around high-value, high-return DX use cases through 2022 and beyond. Most organizations now have a better handle on the new normal and will focus more on cost reduction alongside workflow optimization through targeted investments that help drive resiliency and growth. The divide between digitally determined and digitally distraught organizations that had already formed before COVID-19 across verticals is now more pronounced:

- **Make digital resiliency a top priority.** The pandemic continues to play out, and disruption has not stopped. Emerging challenges like the COVID-19 variants, data proliferation, the rise of consumerism, and new cyberthreats add to preexisting ones like aging populations, the growing burden of chronic diseases, and the shift to value-based care. Limited budgets further

challenge the ability to advance DX via new technology investments. When and where investments can be made, the focus should be on infusing digital resiliency to augment the likelihood of survival and growth. Initiatives should focus on improving data infrastructure, information exchange, and capabilities to improve access and experience, automate and optimize workflows, and facilitate workforce collaboration. Leaders should also consider the implications of such initiatives from the cybersecurity and regulatory standpoints.

- **AI is delivering value in healthcare, do not be left behind.** The use of AI in healthcare has moved past the pilot phase and into production across a wide range of use cases including financial, operational, and clinical. In the recent IDC's *Industry AI Path Survey*, 65% of healthcare organizations are seeing productivity improvements in back office and clinical processes, 56% report new knowledge-based jobs, and 57% reported improved job performance. As healthcare organizations continue to demonstrate value and put AI/ML into production, the appetite will only grow, and the industry will realize the innovation that can be had with AI/ML.
- **Reevaluate data sharing consent capabilities and compliance.** Interoperability is blowing holes in firewalls. Data is becoming more open across portals and applications, necessitating better authentication, identity management, and consent capabilities. Organizations need to be prepared for everything from the need to share data with patients, proxies, and delegated representatives as more data gets mandated to be shared and to be audited for the same.
- **Optimize your digital infrastructure.** A secure, scalable, and highly available IT infrastructure is the stepping-stone of digital transformation. The pace of digital network modernization has ramped up to address the emerging needs of healthcare ecosystems, which a traditional legacy infrastructure cannot keep up with. Healthcare organizations should leverage new opportunities offered by the cloud to manage, maintain, and upgrade the vast array of health IT systems that will shape increasingly connected care delivery models. Recent IDC surveys reveal a need for workflows to be supported with new capabilities that increase automation and resource orchestration as top priorities related to datacenter modernization.
- **Prioritize becoming "data driven" not just "data rich."** The pandemic gave a much-needed push to disrupt the way care is being delivered. Along with the surge in telehealth adoption, integrated care requires more seamless sharing of patient data between the stakeholders of the ecosystem. More than half (52.3%) of healthcare organizations worldwide plan to accelerate the rollout of DX road maps compared with their pre-pandemic plans, according to the IDC 2021 *FERS Survey*, Wave 7. The adoption and optimization of health IT applications and platforms with modern architecture and open APIs capable of interoperating through the HL7 FHIR standard needs to be a strategic priority. This internet of healthcare will help organizations transition from "data rich" to "data driven" and successfully realize DX goals.
- **Acknowledge the blurring boundaries between healthcare and life sciences, and embrace patient centricity beyond clinical trials.** Despite severe challenges, the COVID-19 pandemic is opening entirely new possibilities for the life science industry. The pandemic is driving a paradigm shift in the adoption of digital technologies to help fast-track efforts across diverse areas create innovative solutions beyond traditional therapies. Life science organizations must build on the momentum and make enhanced efforts to embed innovative technologies and data centricity across the entire value chain, to transition beyond the disruption caused by the pandemic to create agile, patient-centric business models; accelerate growth; and safeguard digital resiliency in the aftermath of COVID-19. As the industry innovates, it is critical that patient experience shapes digital transformation, not vice versa.
- **Reimagine the future of work and the delivery of care.** The global pandemic crisis created a pivotal moment for healthcare organizations to execute digital-first strategies, from creating a

digital front door to providing care anywhere. During the pandemic, a digital-first focus helped build resiliency by making it possible to continue delivering services while protecting patients and staff from exposure to COVID-19. In the next five years, healthcare organizations will continue to build upon a foundation of AI/ML, AR/VR, cloud-based infrastructure, connected health technologies, and 5G technologies to discover new ways for healthcare organizations to work, collaborate, and deliver care. Skilling, upskilling, and reskilling will provide staff the essential skills required for expanded job responsibilities to successfully executing digital-first strategies.

## EXTERNAL DRIVERS: DETAIL

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### Pervasive Disruption Continues – Volatility, Opportunity, and Resilience

- **Description:** In an interconnected world, any disruption is felt across the entire ecosystem, leading to more volatility, challenges, and opportunities. Survival is linked not to size or strength but to resilience and the ability to change – to move quickly, adapt, seize opportunities, and be ready for the next disruption. Adaptations and lessons learned from the COVID-19 pandemic are becoming permanent, requiring revised global business and operating models. Digital resilience approaches counter supply chain disruptions. Organizations are preparing for the return to office, the return to travel, new consumer spending patterns, the challenges of finding (higher cost) talent, and the possible return of inflation in an environment of continued economic uncertainty. Innovation and digital resiliency become key to navigating ongoing disruption. Beyond headwinds like the pandemic are crosswinds like exponential scientific advancements and innovations enabled by enormous compute resources – leading to advances in healthcare, food production, alternative energy generation, and storage. The pace of disruption may, in fact, be increasing.
- **Context:** OECD revised its economic outlook for 2022 to 4.4% GDP growth due to strong vaccine rollout and "massive fiscal stimulus by the United States." The global economy, after 18 months of shock, has recovered to pre-pandemic levels. However, the global recovery is uneven. Many countries, vulnerable to a lingering recession, will require three to five years to return to pre-pandemic standards. IDC reports that with growing global growth, 71% of decision makers give top priority to digital infrastructure resiliency investments over the next two years. IDC projects global IT spending to increase in parallel with GDP growth in 2021 and to exceed GDP growth in 2022-2024 (~5%). Digital innovation investments continue to support growth in digital resiliency. "An uptick in forward-looking investments aimed at accelerating the business should ensure that core investments remain stable and digital transformation remains a top priority."

### Cybersecurity and Risk – The Threat Environment Just Keeps Scaling

- **Description:** Cyberattacks keep making global headlines. Reliance on digital channels, ecommerce, and other virtual interactions exposes new attack surfaces and vulnerabilities, exploited by sophisticated global actors. The bleeding edge of digital transformation – health reporting, contact tracing, and hybrid work models – adds to the potential risk to personal information. Ransomware, phishing, email compromise, insider threats, and nation-state attacks are increasingly common events that cause significant disruptions, high costs, and reputational damage. Affected organizations talk about pre-hack versus post-hack approaches to the chain of management, policy, and process: Cyberthreats now pose serious financial risks. Effective management of risk and trust is a new competitive advantage in which "trust = value, brand, and reputation"; now, a trust framework incorporates security, compliance,



privacy, and social responsibility and ethics. In a digital-first world, what is considered critical infrastructure is changing rapidly. On a national level, critical infrastructure is increasingly at risk from ransomware and nation-states, especially where it is privately owned. Governments are focusing on cyber-risk within their borders and as part of international diplomacy. Security efficacy and controlling environments in real time will come into play in determining negligence and culpability.

- **Context:** Cybercrime keeps on growing, with worldwide damages expected to reach \$6 trillion in 2021. Headline breaking events occurred in logistics, tourism, healthcare, software, and supply chain and state, local, and national governments. Perhaps the most striking was the massive attack on SolarWinds that affected thousands of systems, including those of Intel, Cisco, and Microsoft. Financially motivated actions accounted for more than 90% of incidents, with organized crime accounting for 80% of the actors. Cyber-risk may be experiencing a crossover from crime to critical infrastructure. Ransomware affecting a fuel pipeline in the eastern United States set off a wave of panic buying, while Babuk, the cybercrime organization, announced it was quitting its illicit affiliate program in favor of data theft extortion. Verizon calculates that the probability that someone in any company of over fifty people will receive a malicious URL or APK is essentially 100%.

## Embracing Digital First – New Strategies for Complexity and Ubiquity

- **Description:** During the pandemic, changes in behavior, consumption, and supply forced companies to adopt digital-led business and operating models that endure lockdowns, movement restrictions, social distancing, and more. Work from anywhere, connectivity, scalability, security, throughput, resiliency, and redefining internal processes for remote access will define the next normal. Organizations are shifting to a complex hybrid world, changed by delivery of "anything, anywhere" and customer requirements that redefine product and service expectations. As national economies emerge from the pandemic, there is pent-up demand for products and services, especially in tourism, hospitality, entertainment, and travel. Some consumers have amassed household savings. The confluence of heightened savings, pent-up demand, and a return to normalcy will create strong growth for many, but not all, businesses – exacerbating the inequities of recovery and prolonging supply disruptions. However, the spike in demand may be the first wave of permanently altered behaviors and systemic changes. Enterprises must address the complexity and continued evolution of hybrid work, delivery, customer engagement, and supply models. Exponential change will come from successfully embracing and exploiting new complexities in innovative ways.
- **Context:** COVID-19 has acted as an accelerant to adopting digital-first business and operating models. Consumers are expecting to return to in-person shopping and still have delivery anywhere, anytime. Employees are expecting to work from anywhere and go into the office. United Airlines CEO Scott Kirby predicts "huge pent-up demand" for business travel, despite the general adoption of virtual meetings – "as tough as this pandemic has been, it has not changed human desire to be together." OECD projects global economic growth to be 5.8% in 2021 as demand increases with the vaccine rollout. WFH or WFAnywhere has created unexpected demand for long-term "workcation" rentals. Airbnb reports that a significant portion of rentals are now for 30+ days. A hybrid and more complex model is the new strategy.

## Intelligence on Demand – Navigating the Torrent of Data

- **Description:** Many organizations are drowning in data they are collecting but not using, focusing on the immediacy, not the importance, of data. Artificial intelligence is playing a key role in interpreting and harnessing huge volumes of data to create insight and value and enable dynamic learning across the organization and in the flow of work. But organizations

need to maintain a balance between the potential of AI and the realization that people are still needed in the loop. Delivering intelligence where and when it is needed poses new challenges to resource allotment and data control. And as automation and augmentation increase, so do concerns around trust, visibility, and responsibility. Issues with bias and misuse, surveillance, invasions of privacy, and more are met with government interventions, regulations such as GDPR, and antitrust actions. While regulations may level the playing field for data and automation, competitiveness requires creativity, differentiation, and balance between governance and innovation. Organizations that strike that balance and harness data, AI, and learning will achieve an asymmetrical advantage in the market, benefiting from superior predictions, improved engagement, processes, operations, enterprise decision making, and resilience.

- **Context:** Where data delivers value, ensuring its veracity and transforming data into insights are strategic imperatives. In 2020, 64.2ZB of data was created or replicated globally. IDC predicts the Global DataSphere will grow at a CAGR of 23%. But it is not just having more data that matters. Based on IDC's Global DataSphere study, less than 3% of the data currently created is analyzed to affect enterprise intelligence. In an IDC survey of mid- to upper-level managers, 59% say they are overwhelmed by the amount of information available for decision making; however, 45.6% say they do not have enough data and information available for making decisions. Organizations that solve that problem will be the winners of the battle for intelligence.

## Digital Ecosystem – Thriving in a Multiplatform World

- **Description:** Understanding, participating in, and provisioning the digital ecosystem that will sustain, advance, and scale business and operations are essential for every business. A digital business platform, the architecture to support the future enterprise, is the assembly of technologies, capabilities, and data upon which digitally enabled organizations run. In the emerging multiplatform world, infrastructure, pervasive compute power, data management, intelligence, and connectivity can all be provided independently as services. The new dynamic is to integrate them at scale to gain control and minimize technical debt while still providing choice. Becoming a digital business requires a shift from traditional, linear processes that start and end in the organization toward platform-based, data-driven value chains that link to external partner ecosystems. The open integration of platforms into those ecosystems plays together better than other models based on closed alliances and facilitates innovation across the enterprise and across the business ecosystem. This enables the network effect of ecosystem economics to generate new value beyond the organization or technology itself.
- **Context:** The digital economy has spread rapidly throughout the world. Leading organizations are shifting from digital platform thinking to new digital ecosystems to evolve their business models, capture innovation, and manage technology architecture. IDC predicts that by 2023, the need for G2000 companies to access and monetize multipartner solutions will lead to fivefold growth in marketplaces facilitated by SaaS-based ecosystem orchestration platform deployment. And that by 2024, net-new production-grade cloud-native apps will increase to 70% of all apps because of the adoption of technologies such as microservices, containers, dynamic orchestration, and DevOps. This represents a fundamental shift in business strategy – moving beyond product differentiation and pricing toward ecosystem-based value creation and the transformation into digital-native enterprises.

## Workforce Outlook — Redefining Teams, Reinventing Models, and Rethinking Leadership

- **Description:** A heightened focus on the employee experience is driving momentum for digital collaboration and hybrid models of work that enable employees to function both remotely and from company facilities. Challenges facing the 21st century economy require that workers engage as dynamic and reconfigurable teams that can quickly adapt to business demands and new market requirements. Organizations are becoming more agile and less hierarchical, refocusing on employee engagement, cross-functional collaboration, and redrawing traditional boundaries. A significant challenge, the global competition to find, hire, and retain digitally skilled employees is now paired with the challenge to find employees skilled in communication, critical thought, and creativity. Complementing the shift to work from home, new models are emerging in fabrication/assembly, patient/citizen care, and warehousing/transport, changing the work experience, environments, and definition of digital work. Organizations need to rethink their relationship with workers and the creation and retention of skills to meet this demand both in person and digitally in the flow of work.
- **Context:** IDC's *2021 Future Enterprise Resiliency Survey* indicates that 49% of respondents anticipate remote and hybrid work models will be an embedded part of accepted work practices for many industries. Organizations are increasingly focused on being resilient in the face of uncertain global and business challenges, including enabling flexible work (and contract) models. These models are driving the acceleration of technology innovation focused on offering a parity of experience for workers who must access key resources across different locations, time zones, and devices. The rise of cloud platforms is enabling employees to work more independently and focus on outcomes. Physical facilities are also changing dramatically to offer safe and instrumented opportunities to support hybrid collaboration.

## Engagement Reimagined — From Responsive to Anticipatory

- **Description:** The COVID-19 pandemic has shifted what customers care about and how consumers and brands engage and interact. Self-service and "delivery anywhere" are now enduring customer engagement practices. The online digital experience has become more important in distinguishing one brand from another. Companies with the best price, coolest product, or most memorable marketing campaign do not necessarily have an advantage compared with companies that provide "empathy at scale" in safe, secured, and seamless experiences. The boundary between customers and employees is blurred, while a wealth of data allows companies to emphasize personalization and a consistent contextual experience. At the same time, this explosion of data accentuates the importance of data security. Customers care about the safety and security of employees, how customer data is collected and used, and a company's environmental and social justice efforts. Companies need to understand the different contextual expectations of their customers — whether they are students, patients, consumers, or businesses — and shift how they engage and support their customers to create experiences that are empathetic, personal, compelling, and relevant.
- **Context:** IDC's *Future Enterprise Resiliency Survey* shows that 51.3% of enterprises worldwide expect to increase spending on customer engagement applications to stay connected digitally and intelligently with their customers. Even as more traditional physical customer interaction channels return, staying digitally connected in real time with the end customer remains the predominant method to deliver relevant and timely communications. The use of intelligent analytics-driven platforms ensures that the outcome of any customer journey is the right one. Organizations continue to focus on consistently connecting with existing customers, patients, and citizens — through ongoing engagement and collaboration —

that will help drive new products, services, and experiences. The need for a hybrid physical/digital product and service capability across every industry continues to accelerate.

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### Related Research

- *IDC TechBrief: Prescription Digital Therapeutics in Healthcare* (forthcoming)
- *IDC Perspective: Making the Case for 5G in Healthcare* (forthcoming)
- *Prescription Digital Therapeutics in Life Sciences, 2021* (IDC #US48321021, forthcoming)
- *Critical External Drivers Shaping Global IT and Business Planning, 2022* (IDC #US48047121, October 2021)
- *IDC PlanScape: The Digital Front Door for Providers* (IDC #US48034021, August 2021)
- *IDC TechScape: U.S. Connected Health Technologies, 2021* (IDC #US44610820, July 2021)
- *IDC's Worldwide Digital Transformation Use Case Taxonomy, 2021: Value-Based Health* (IDC #US46582221, June 2021)
- *The New Healthcare Experience: Bringing the "Patient of One" Vision to Life* (IDC #EUR147856921, June 2021)
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- *IDC Market Glance: Healthcare Provider Operational IT Solutions, 2Q21* (IDC #US46584121, May 2021)
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- *IDC TechBrief: Digital Technologies for Mental Health* (IDC #EUR147156220, December 2020)
- *IDC MarketScape: U.S. Customer-360 Data Platforms for Payers 2020-2021 Vendor Assessment* (IDC #US46997020, December 2020)
- *IDC TechBrief: Digital Technologies for Mental Health* (IDC #EUR147156220, December 2020)
- *IDC FutureScape: Worldwide Future of Work 2021 Predictions* (IDC #US46248920, October 2020)
- *What is the Future of Industry Ecosystems?* (IDC #US46828520, September 2020)
- *Providers in the Pandemic - Key Health IT Considerations for U.S. Healthcare Providers in the Response to COVID-19* (IDC #US46268220, May 2020)

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