

White Paper

Innovators Will Be Heroes: Shifting the Paradigm from a Focus on Data to Outcomes Through Cloud-Based Digital Health Platforms

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IDC OPINION

Healthcare organizations face a new era that will digitally reshape the industry and disrupt business as usual. New technologies provide better and more agile business process optimization and business model transition. Data continually and rapidly expands in variety, velocity, and volume alongside shifting customer needs, behaviors, and propensities to engage. Healthcare organizations must now manage the data in their systems and adjacent ecosystems to support new models of care delivery and relationship management. The data is already there; it is now a question of how to exploit it in ways that generate impactful insights, drive better decisions, engage patients meaningfully, and pursue value effectively. A new paradigm in data management with a focus on outcomes will deliver on the promise of integrated and value-based care models, population health management, and risk stratification. This paradigm also enables new business models that require interdisciplinary data sources across the patient ecosystem to thrive. Population health and integrated and personalized medicine drive new approaches for registering, storing, sharing, and using patient data. In addition, stakeholder integration, collaboration, and interoperability create a centralized platform where an ecosystem of technologies can support future business models and use cases for the greater good of the patient. Cloud-based digital health platforms are at the center of all such change and form an integral part of a new vision for healthcare.

IN THIS WHITE PAPER

This IDC White Paper analyzes how cloud-based digital health platforms can support digital transformation (DX) and new care models. These platforms integrate, aggregate, and orchestrate data from different sources to support a patient-centric approach through data from the entire patient journey in an integrated and personalized care setting. In other words, platforms will support an open information management platform and serve as a key building block in creating a sustainable healthcare ecosystem. This innovative ecosystem, enabled by a digital health platform, integrates the building blocks of care for customers, patients, families, communities, and populations through an effective synergy between providers, vendors, and technology. Healthcare organizations must evolve by leveraging cloud-based digital health platforms not just to support the needs of new emerging health economies but also to be future ready and able to adapt and change more rapidly to meet and deliver on future health industry needs.

This document includes a technology profile of DXC Open Health Connect as an example of a cloud-based digital health platform.

SITUATION OVERVIEW

Digital Transformation: The Dawn of a New Era

The healthcare industry is at the dawn of the new DX era. The patient of today and tomorrow is not the patient of yesterday. Business models and processes must emerge and scale through cutting-edge technologies that empower healthcare stakeholders to engage more effectively and radically change the status quo. At the heart of all DX impacting the future of the industry are the shifts toward value-based and consumer-driven healthcare. Alongside rising costs and performance goals, these shifts aggressively shape new challenges and create new opportunities. Technologies that enable new DX capabilities and deliver on better digital patient experiences, operational efficiencies, and clinical effectiveness can instill the states of organizational agility, competitiveness, and sustainability needed to champion the future of care. Cloud-based digital platforms that lie at the heart of the information fabric between relationships, data, and code will drive these capabilities and help achieve "digital nativity" across the organizational culture and ethos. This is the new modus operandi for healthcare organizations, and those that are quick to realize it will shape new DX platforms, workflows, and journeys toward maximizing value. Accelerating the digital journey is not an option but a necessity for organizations to reach the new heights needed to respond to overarching industry forces and deliver on the promise of care in the new DX era.

Healthcare Ecosystems: Forming an "Inside Out" Perspective

The global healthcare and life sciences landscape is in many ways fraught with broken and badly connected processes. With the shift from volume-based to value-based care, provider, payer, and life sciences organizations must work more collaboratively. Implementing digital technologies is not enough to succeed; instead there needs to be a comprehensive shift that touches every aspect of healthcare business. Forming an "inside out" perspective of healthcare ecosystems allows for an effective starting point toward appreciating such a shift. Here the advancement of technology creates an exciting new dynamic in how consumers interact with healthcare. This leads consumers to use technology in self-reporting and generating data, and by using the data collected by technology, consumers make positive behavioral changes to manage and improve their health and well-being. Furthermore, consumers increasingly want and expect healthcare to be simple, coordinated, seamless, transparent, and secure. As a result, consumers demand greater choice, better value, and outstanding service from providers. Modern healthcare businesses and forward-thinking leaders can get ahead of the game by developing their ecosystem strategies and having a line of sight to track growing ecosystems and anticipate their impacts.

The Rise of Consumerism: Engaged Patients and Experiential Care

Healthcare consumerism is driven by engaged patients who expect better experiences. Care teams and tools that help make the right decisions to drive better outcomes, higher patient satisfaction, and effective aftercare plans will help retain patients and improve their health. To achieve this, organizations must first stratify patients accurately, and segmentation-based analytics infused with actionable analytics across the customer experience value chain will be able to provide the right suite of services and channels (inpatient, outpatient, or virtual) needed. Patients expect high-quality and safe clinical care, engagement, and value against the cost of treatment. To enable these facets, healthcare organizations need effective engagement tools and platforms that can help implement evidence-based changes based on actionable insights and advise on options toward a lean operational and personalized clinical care model that keeps costs down, enables better and faster outcomes, and delivers convenient access and meaningful experiences.

"FUTURE READY" CARE MODELS: PERSONALIZING THE PATIENT JOURNEY

Within the new industrial paradigms and perspectives that are taking shape, healthcare organizations that aim to be ready for the future face a difficult balancing act. These organizations must ensure equitable access and financial sustainability while improving and reducing the variation of clinical outcomes in healthcare systems. Furthermore, value-based models must be combined with integrated and personalized care models that increase collaboration across the healthcare value chain, adopt more personalized approaches to treatment, champion patient experience, and embrace an outcomes focus.

Balancing the combination of disruptions in care models relies upon major shifts in organizational culture and an ever-increasing interdependency of processes. Boundaries between healthcare organizations (payers, providers, and life sciences) are blurring in response to the increasing recognition of the role patients play in their health and care. As a result, next-generation care models and platforms are forming through increased market consolidation and verticalization as witnessed through a number of recent significant mergers, acquisitions, and partnerships (e.g., CVS-Aetna, Cigna-Express Scripts, Salesforce-Cerner, and Amazon-Berkshire Hathaway-J.P. Morgan) alongside other notable moves by non-healthcare players (e.g., Apple). These collectively hold the intention of trying to fix the market, driving new efficiencies and competing for market share. Yet it is still too early to determine how these new players and their models plan to alleviate and address market challenges clinically and technologically at the patient level.

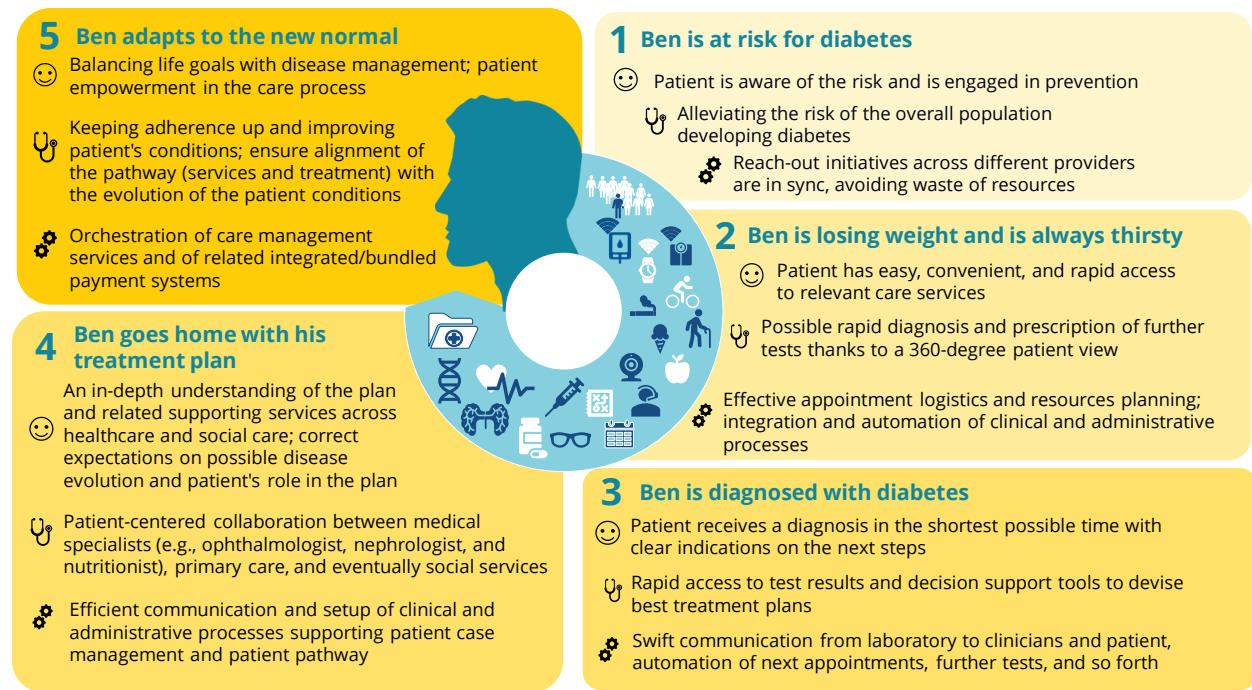
However, what appears to be manifesting for the future is a converged scenario, where traditionally siloed and batched processes focused on a single encounter with a patient are superseded by more intelligent reformations of care pathways. Such reform efforts will transform the patient journey by considering the different stages of patient morbidity and conditions (from healthy to preclinical and clinical) toward a more revolutionized care continuum, with journeys that are personalized while aiming for better outcomes.

Convergence and Intelligence: Toward an Outcomes Focus

Intelligent care pathways building on converged scenarios and leading to better patient journeys and an outcomes-focused care continuum can greatly impact the quality and longevity of life for patients. Furthermore, cloud-based digital health platforms are well-positioned to play a vital role in galvanizing the changes needed to bring these care engines to life. For example, diabetes research shows greater levels of granularity in the two major classifications of the disease (i.e., Type 1 and Type 2), particularly in the Type 2 phenotype with multiple molecular subgroups. An intelligent care model takes into account such granularity in each step of the workflow by allowing a wide variety of data types and sources to come into play (see Figure 1). With the emerging availability of clinical genomics data and advancements in platform technologies, precision medicine approaches that acknowledge such individual variability in genetic makeup, etiology, and biomarkers become more attainable. Orchestrating precision medicine alongside care management, medication adherence, patient awareness, and engagement through cloud-based digital health platforms forms a powerful and highly advantageous model for the treatment of diabetes.

FIGURE 1

A Diabetic Patient's Journey: Delivering Outcomes on Three Levels



Source: IDC, 2018

From risk stratification to accounting for the presence of a gene mutation, data can be used in cloud-based platforms beyond the single process or circumstance as part of an information stream that flows across different care settings. This overarching and digitally transformative approach to data management can help automate processes and support decisions of different healthcare stakeholders, allowing for truly personalized continuums of care. EHR 2.0 and rapid innovations in other key health IT areas such as interoperability, integration, analytics, omni-channel patient engagement, and patient experience are shaping the open architectures and intelligence needed to pave the way for emerging technologies (e.g., artificial intelligence [AI], robotics, and blockchain) to impact the healthcare value chain even further. Next-generation models must align care needs with patient journeys that benefit from increased proximity and accessibility to commonplace technologies, where digital is at the core, information is readily available, and patients, by nature of their disposition, are still human.

Delivering on the Digital Promise: Humanizing Care

Technology suppliers and buyers looking to deliver on "digital" must increasingly appreciate that care-seeking consumers, new and existing patients, families, employees, and populations need humanized care. The rise of consumerism must be met by providers embracing the opportunity to deliver more convenience, personalization, and value for their patients. Patient engagement, patient experience, and customer relationship management (CRM) technologies in addition to increased levels of transparency in care must become core clinical and operational practices to truly humanize care. Silos that once existed must also come together (e.g., between business, operations, and clinical) to form new initiatives around integrating social determinants of health, consumer, and economic data as a means to further completing the picture of the patient toward humanizing care. In addition, a new contract must be written in the form of enhanced digital trust frameworks that allow systems to scale in secure ways through added privacy, confidentiality, and cyber-resilience measures. The future is now, and healthcare must shift its focus from data to outcomes in an optimized, agile, and humanized manner to adapt to new regulations, shifting consumer lifestyles, expectations, and demands, as well as any tendencies to dehumanize care.

FUTURE OUTLOOK

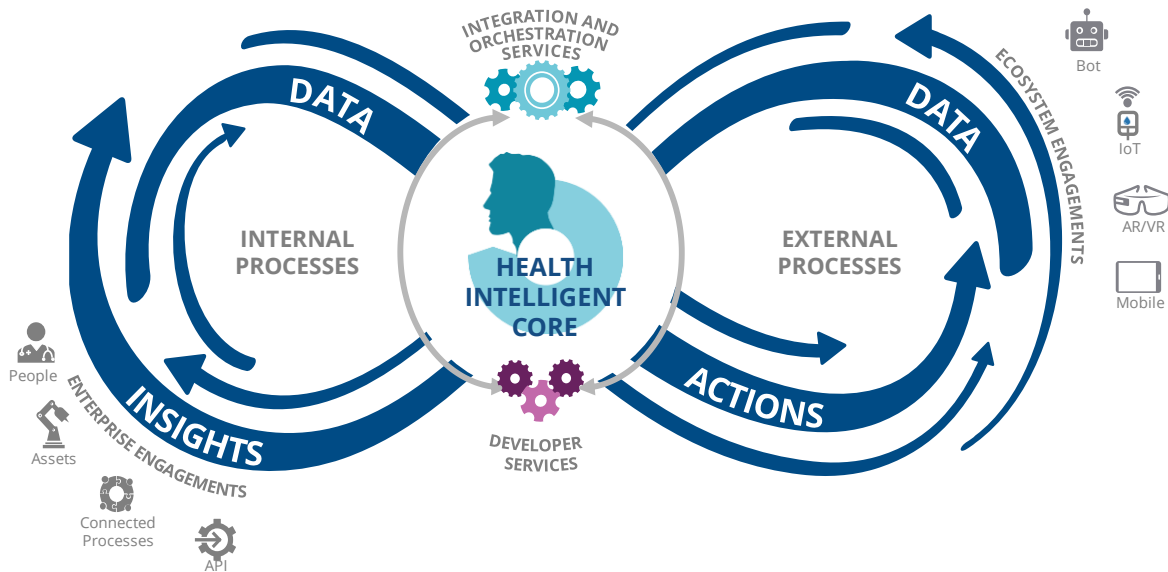
Cloud-Based Digital Health Platforms: Key Enablers of a New Healthcare Paradigm

Processes and operations supporting new end-to-end clinical pathways need to be underpinned by insights driven by analysis of real-world evidence and data from the entire spectrum of the biological, clinical, and social domains of health. According to IDC Health Insights, by 2019, more than 50% of life sciences and healthcare companies will have dedicated resources to support accessing, sharing, and analyzing real-world evidence for use across their organizations. Furthermore, by the end of 2020, 25% of data used in medical care will be collected and shared with healthcare systems by the patients themselves. Therefore, a more granular and actionable 360-degree view of the patient can be realized if healthcare organizations adopt a cloud-based digital health platform as the technological foundation for their impending DX strategy.

During the next five years, the importance of cloud-based digital health platforms will upshift dramatically as the healthcare industry moves into the second chapter of the 3rd Platform or what IDC calls the "multiplied innovation" chapter. The "multiplied innovation" chapter is all about a new operating model built around cloud-based platforms and ecosystems that support connected and collective innovation among "communities" of digital innovators within and outside the organization (see Figure 2). This distributed innovation model will enable healthcare organizations to rapidly evolve and adapt to healthcare needs in an effective way in terms of speed, scope, and scale.

FIGURE 2

Conceptual Model of the Digital Health Platform: Patient Journey as the Health Intelligent Core



Source: IDC, 2018

Digital health platforms will provide a reference set of tools and services that support healthcare organizations to take advantage of ongoing disruption at the point of service. As a result, a new generation of digital healthcare services is spawning and reaching consumers in a ubiquitous, faster, and more personalized way. Services will increasingly rely on virtualization of care through telehealth and patient engagement technologies that leverage 3rd Platform and innovation accelerator technologies (such as cloud, big data and analytics, artificial intelligence, IoT, social, and mobile). These services and technologies can conveniently accommodate patients' needs and preferences. IDC Health Insights predicts that digital healthcare services will account for 6% of global healthcare expenditure by 2021. Healthcare organizations that want to make the most of the benefits that these differentiated and disruptive services can provide need a platform that aligns their information, integration, and management strategies to better inform decisions, innovate, and augment workflows.

From Data Rich to Data Driven: A New Approach to Data Curation, Integration, Management, and Utilization

For decades, healthcare organizations have produced vast amounts of data stored in various clinical, administrative, and logistic applications. Democratizing all data and pursuing new meaningful use cases in healthcare or life sciences require a new approach to IT architecture. While data might still reside within core applications, it needs to be aggregated in warehouses and data lakes to deliver enough evidence to support decision making and thereby move the healthcare organization from data rich to data driven. This new scenario where data is integrated uses both traditional and next-generation interoperability services to support the convergence of analytical and operational workloads. Historical data (i.e., patient records, clinical research, and reimbursements) and datastreams (from medical devices, logistics systems, wearables, etc.) are assembling new information bridges where analytics

supports real-time decisions and intelligently drives transformative capabilities such as care pathway personalization, process automation, and care resource planning.

The call to action for providers is not only about creating a longitudinal patient record; as business data and insights evolve, the call to action is also about ensuring adaptive and composed infrastructures that serve the system of record. With an open and API-based DX platform, it will be possible to connect broad application portfolios and serve different care/administrative/research settings without losing overall system coherence and reliability. Nimble API-driven platform environments will more rapidly meet the demands of specific clinical roles and specialties for integrating new applications and data sources. These environments are able to add, associate, and organize structured and unstructured data to create a system of insight, where the information fabric for real-time analytics and closed loop intelligence with zero latency augments and automates workflows as well as supports clinical, administrative, and strategic decisions.

Assembling data to identify high-risk patients within a cohort, enable predictions, and deploy evidence-based medicine will help organizations become more efficient in day-to-day business. However, healthcare organizations are overwhelmed by the ongoing explosion of volume, velocity, and variety in data (e.g., from EHRs and radiology). Overall, the massive amount of unstructured data could help make groundbreaking medical breakthroughs. Thus, investing in an enabling and data orchestrating DX platform will support advanced analytics solutions and help drive decision making and efficiency throughout the entire organization.

The development of a converged healthcare ecosystem also involves payers and life sciences organizations that will need to embrace new digital technologies to optimize the utilization of new data sets in health plans, clinical research, and development. Payers, researchers, and clinicians can dig deeper by gathering data from patient engagement and new feedback loops. Smart mobile devices and social media can further enhance health plan payer functions and the patient recruitment stage for life sciences research. IDC Health Insights research reveals that digital mobile engagement among life sciences companies, patients, payers, and providers will have increased 50% by 2019, improving brand sentiment, member management, clinical trial recruitment, and medication adherence. The emergence of cloud solutions will harness stronger collaborations among healthcare organizations by aggregating data from disparate sources to develop research hypotheses. More novel approaches to evidence-based clinical trials are then possible as patients share increasing amounts of data, and it becomes possible, for example, to quickly identify potential drug safety issues and new uses for existing approved drugs.

Elastic Infrastructure: Making Future Gains Toward New Business Agility

Besides catalyzing innovation and being key enablers of a new healthcare paradigm, cloud-based platforms are helping healthcare organizations gain further and perhaps more immediate benefits. Cloud-based platforms help modernize legacy application architectures via hybrid cloud infrastructures to allow new data sharing, aggregation, and interoperability capabilities. Most healthcare organizations have a high degree of application and data legacy that is often inflexible and exists in disconnected silos with long and expensive change cycles. By connecting on-premises and cloud-native solutions through leveraging economies of scale for standardized IT components, a hybrid cloud will be the glue that addresses these shortcomings. Healthcare organizations will be able to further leverage digital investments already made and exploit existing data in new ways. Moreover, a platform based on comprehensive syntactic, semantic, and process interoperability principles and standards enables healthcare organizations to decouple data from applications and reduce costs when healthcare providers decide to implement new applications and decommission old applications.

In this way, healthcare organizations can facilitate the creation of collaborative communities that feed on data. Through the use of pre-integration tools it becomes possible to rapidly add technology and business partners. Therefore, healthcare organizations will be able to pool resources across the extended industry and leverage standardized services available in the market, without the need to reinvent their infrastructure. The flexibility of the platform and underlying data management approaches will open healthcare organizations to benefits offered by new development methodologies. This will lower total costs for adding new capabilities and support higher service levels over the long term. Compared with expensive enterprisewide modernizing strategies, this type of platform might be the most cost-effective way for most organizations to pursue opportunities in the new digital healthcare economy.

The agility of the platform will also help healthcare organizations become more compliant with data security and privacy regulations, which is a key priority for healthcare organizations worldwide. Evolving regulatory requirements for data privacy, retention, and protection (e.g., HIPAA in the United States and GDPR in Europe) and the increasing risk of the related legal and financial consequences are exponentially increasing information governance costs. The typical siloed architectures of healthcare information systems make compliance with new requirements and shifting regulations more error prone and resource intensive. Cloud-based digital health platforms can ease the adoption of security by design, intelligently managing the complexity and risks associated with patient information sharing and collaborative care provision and without compromising on the efficiency of the workflow or end-user experience. Better control over data integration and information flows makes it easier for healthcare organizations to enforce robust role-based access policies to maintain patient confidentiality according to the different national and local legislations as well as to conduct compliance audits and provide required information access.

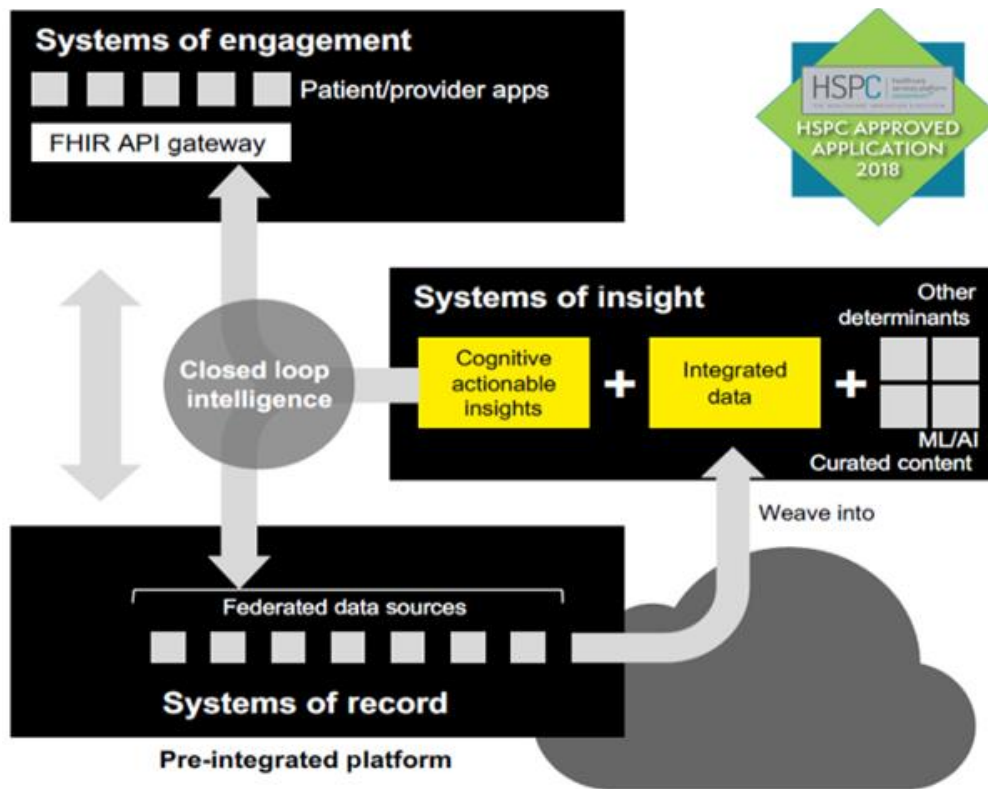
DXC OPEN HEALTH CONNECT – A DX PLATFORM CAPABILITY

To meet the challenges most healthcare providers face and to leverage investments already made, new digital platforms are emerging where integration is a key attribute. One of the first movers into this space, where a simple integration engine is replaced by an "intelligent" data orchestration and integration DX platform, is DXC Open Health Connect. Its integration is regarded not only as data aggregation but also as the ability to integrate different stakeholders across the care continuum as well as existing vendors in an application architecture ecosystem. DXC Open Health Connect holds the potential to disrupt the digital healthcare industry and force siloed department-specific vendors to change strategy from hospital or even department-specific coverage toward a renewed focus on how to engage and be part of the new data, stakeholder, and vendor integration community. This promotes open architecture, use of standards, and true interoperability for the greater good of the patient and thus brings together all the pieces of healthcare transformation.

DXC Open Health Connect helps clients build a connected ecosystem while recognizing that healthcare goes beyond the walls of a hospital by allowing access to cross-sector data sets in a vendor-neutral way. This helps organizations move "business units" toward "intelligence units" to support value-based models. Furthermore, by allowing access to cross-sector data sets, the platform enables clients to derive maximum value from the investments they have made in EMRs, hospital information systems, IoT systems, and so forth through an interconnected set of systems and closed loop intelligence delivering on four core capabilities: proactive decision making, contextual interactivity, real-time automation, and journey-focused innovation (see Figure 3).

FIGURE 3

Digital Health Platform to Revolutionize Care



Source: DXC Technology, 2018

DXC Open Health Connect enables cross-sector data integration, analytics, and actionable insights. These features shorten data access times, provide context around the data, and deliver data back to the workflow of the clinician. DXC Open Health Connect aligns with what IDC defines as the DX platform. The emerging technology architecture accelerates DX initiatives for the enterprise, enabling the rapid creation of externally facing digital products (integrated care, personalized medicine, services, engagement, and experiences) while aggressively modernizing the internal IT environment toward an intelligent core in parallel.

The health industry will evolve rapidly toward the development and usage of this health "instance" of the DX platform, and clinical applications will be important data sources (and enablers). While most clinical applications will continue to be digital applications primarily focused on documentation, internal workflows, and decision support within the hospital, the DX platform will be the engine to enable new and innovative business models across the patient ecosystem.

DXC Open Health Connect is an internally facing as well as an externally facing platform – with the key objective of creating a network, or an ecosystem, of connected healthcare stakeholders that use the information and services available to them. DXC Open Health Connect is an innovative, open digital platform that delivers the speed, scale, and flexibility needed to securely gain value from data to drive better insights and financial and innovation flows across the healthcare ecosystem for improved care delivery.

Value gains are achieved by DXC Open Health Connect coupling its capabilities around:

- **Interoperability (data):** Helps integrate disparate data from across the healthcare ecosystem to support the creation of a longitudinal care record.
- **Analytics (insights):** Provides evidence-based insights about populations and individuals to improve outcomes.
- **API director (care and innovation):** Enables the creation of information-rich applications while governing and controlling access to patient data.

DXC Open Health Connect's value proposition is focused on enabling healthcare providers to pursue a new business model while also leveraging the value of digital investments already made. According to DXC, the key benefits of this cloud-based integration and orchestration platform are:

- **Reduced time to value:** DXC Open Health Connect helps providers shorten the time to derive value from analytics services. The solution quickly delivers enterprise value in areas such as patient engagement and predictive analytics.
- **Simplified data access:** Healthcare providers get simplified, ubiquitous access to all relevant data. Business leaders can benefit from a governance, risk management, and compliance framework that ensures structured, consistent access to patient data.
- **Vendor-neutral connectivity:** The platform is engineered to be system agnostic because the solution sits on top of current systems and is not confined to rigid vendor road maps. The solution is interoperable with old and new systems, so there is no need to rip and replace old systems.
- **Actionable insights:** DXC Open Health Connect transforms the enterprise by producing insights throughout the healthcare ecosystem, translating to better outcomes for patients. At its core, DXC Open Health Connect links networks and enables point-of-care automation.
- **Population health management:** By providing the ability to care and collaborate, DXC Open Health Connect also enables population health management and dynamically generates an integrated care record, supporting risk-based analysis and stratification.
- **Patient engagement:** Patient engagement transforms patients into active participants and not just passive recipients of healthcare services. This means empowering patients to engage in disease management and healthy living and keeping patients away from expensive and unnecessary inpatient treatments, thereby improving prevention and leveraging patients as a resource. With the DXC Open Health Connect platform, healthcare organizations will be able to deliver on these promises and integrate patient-reported outcomes, data from wearables, and other patient-centric data sources to increase and empower patients as a resource.

CHALLENGES/OPPORTUNITIES

A conservative approach to technology procurement can present a challenge for most organizations. Non-healthcare industries are moving toward and adopting infrastructure elements such as cloud, mobility, big data and analytics, and social faster than healthcare, enabling an agile environment using innovation accelerators such as IoT with cognitive and next-generation security capabilities from different vendors as an industry ecosystem. In healthcare, there is a very traditional and conservative approach to digital procurement, with almost nonexistent requirements around cloud and intelligent data orchestration. There seems to be an educational and knowledge backlog among most healthcare providers, where the benefits and value of the DX platform must be conveyed before the market matures into wider enterprise procurement and adoption.

With the current global reimbursement models, where healthcare providers are financed by the productivity occurring within their own organizations, DX platforms that promote collaboration and integration beyond the four walls of the hospital will be challenged when trying to scale. There are other health integration exchange products that can support and enable point-to-point integration and data exchange within an organization, but they often lack the intelligence, business model, and process support to deliver the necessary capabilities if providers wish to evolve in the new DX economy. Providers will need not only to evolve but also to embrace the notion that change will be more frequent, and initiatives will be expected to be completed quicker than ever before. DX platform vendors must address this issue by creating a clear message around their unique capabilities and convey that message to the market in a way that resonates with the key audience.

Another challenge is that with an open, agile, and innovative DX platform, there is also a need for considerable knowledge and business leader commitments on the provider side. Capabilities such as enterprise architecture, integration analytics, data governance, and business alignment become more important in an open and integrated environment. Those capabilities might not be available to the healthcare provider, introducing an unnecessary risk to the DX platform implementation project and clinical business transformation project overall.

ESSENTIAL GUIDANCE

It is important for healthcare executives to align their strategies and road maps with the future models of care. Doing so requires not only strategic alignment but also concrete and relevant innovation and investment road maps. Moving forward together to pursue new business models and leverage existing data into meaningful use cases requires a data-driven stakeholder integration approach. The data is already there; now it is time to move the healthcare organization from data rich to data driven. The digital health platform stands as a cornerstone for that transition.

Healthcare CEOs must consider:

- Formulating and executing a DX vision for the organization, where CEOs drive the organization to digitally transform its products, services, and experiences to become data driven with an outcomes focus.
- Making DX a part of the company strategy by facilitating communication between business and technology functions; aggregating information across departments, business units, and geographies; and ensuring continuous improvement efforts occur that allow for the delivery of critical insights to the right people at the right time, which ultimately benefits the customer.

Healthcare CIOs must consider:

- Engaging in discussions with healthcare leaders on business strategies to define how personalization, integration, and value are important in establishing specific DX key performance indicators (KPIs).
- Reviewing the data management strategy combined with enterprise architecture analytics to produce a road map for investments and innovation that will enable the entire organization to embrace the new data-driven agenda.
- Partnering with a vendor that has an end-to-end services portfolio or an equivalent ecosystem consortium. The vendor must have substantial knowledge from infrastructure to industry-specific applications and business change management. Furthermore, the vendor must also be able to support enterprisewide service requests from highly technical to clinical and core business development assignments. Such vendors must be able to move the healthcare provider toward a data-driven care delivery model.

About IDC

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