



# Toward Data-Driven Healthcare: Simplify and Democratize Analytics with Intelligence

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# Executive Summary

Healthcare organizations cannot deliver on the demands for access to high-quality data without an AI and analytics infrastructure.

The need for access to high-quality data has never been greater while the industry continues to struggle with data fragmentation, legacy IT environments, tactical approaches to data and analytics, and barriers to operationalizing artificial intelligence (AI) and machine learning (ML). The result is limited value from investments in analytics and AI and a barrier to becoming a data-driven organization.

## Two key steps to realizing greater value in data and analytic investments:

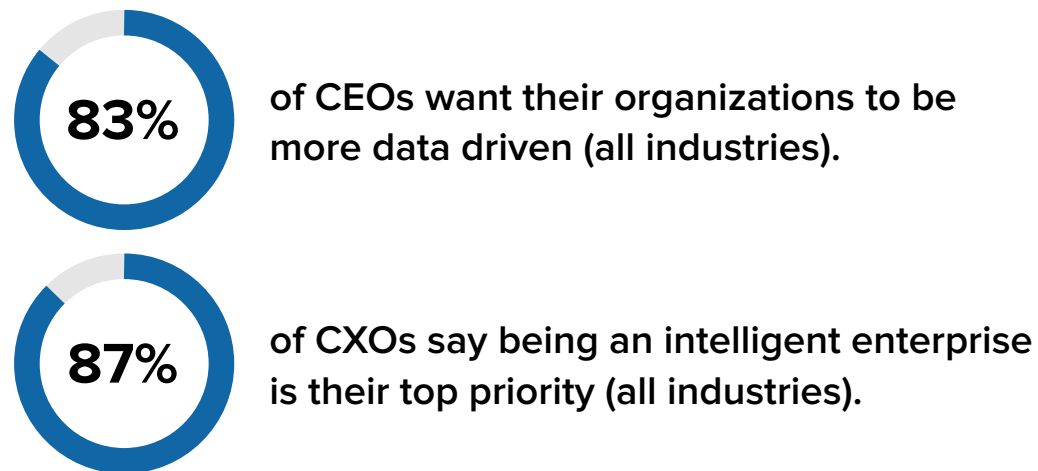
- ▶ Establish and staff a data management and governance authority.
- ▶ Access an AI and analytics infrastructure to deliver data on demand and provide access to a wide range of analytics and AI technology on an agnostic infrastructure.

# Why Data-Driven Healthcare?

Costs in the U.S. healthcare system are growing at a rate above gross domestic product (GDP) and quality of care continues to lag. After years of investment in data and analytics, healthcare organizations are left with silos of data, a plethora of point analytics solutions, and limited support for AI. Data is the healthcare currency of the future, and as such, investments must be made in an infrastructure of AI and analytics.

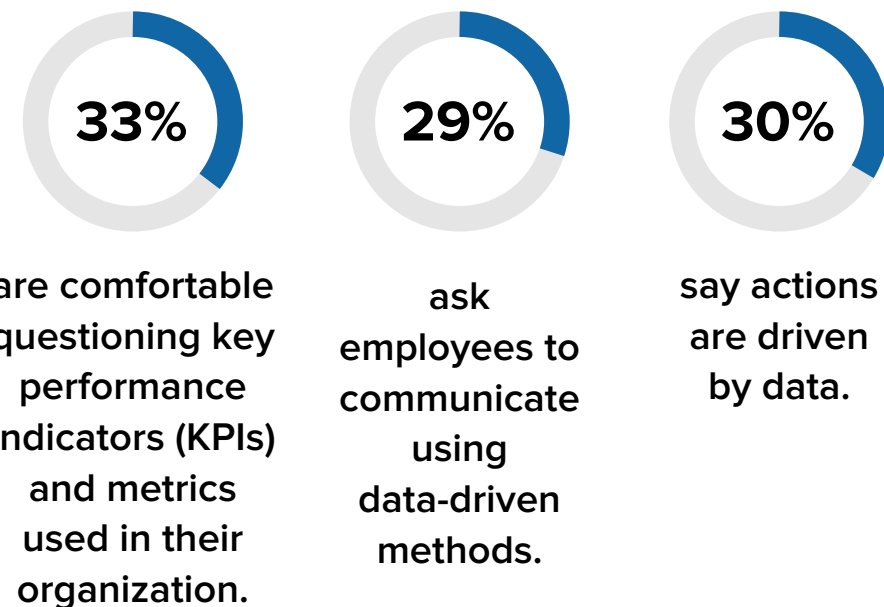
Executives across all industries understand the value of data-driven decisions, but few organizations have invested in the actions necessary to operationalize the concept. The solution is both technical and cultural. On the technical side, data must be accessible and actionable. Culturally, data must be a key component of all decisions, management by objectives, and forms of communication.

## Within the C-suite, leaders recognize the importance of data to their larger business strategy:



Source: IDC's Data Culture End-User Survey, 2021

## Unfortunately, few executives are acting on technical and cultural principles:



# High Cost and Poor Quality in Healthcare

The U.S. healthcare system continues to deliver poor financial and clinical outcomes despite efforts to “fix the system.” Although the rise in healthcare expenses continues, it has been slowing.

- ▶ Healthcare costs are growing nearly 1% faster than GDP, with estimates that they will make up 20% of GDP by 2028.
- ▶ The rate of U.S. maternal mortality is 26/1000; in comparable developed countries the rate is 9/1,000.
- ▶ Overall age-adjusted mortality rate per 100,000 population is 840 in the United States compared to the average of 690 in similar countries.
- ▶ Age-standardized disability-adjusted life year (DALY) rate per 100,000 population is 24,306 in the United States; in comparable countries it is 18,533.<sup>1</sup>

Even those with employer-sponsored coverage are carrying an increased financial burden for healthcare through higher deductible plans and reduced benefits.

The average deductibles in employer plans more than doubled between 2008 and 2017, from

**\$869 TO \$1,808  
PER YEAR.**<sup>2</sup>

**Only 62% of adults  
were very or  
somewhat confident  
in their ability to  
afford healthcare.**<sup>3</sup>



1. World Health Organization. One DALY represents the loss of the equivalent of one year of full health. DALYs for a disease or health condition are the sum of the years of life lost due to premature mortality (YLLs) and the years lived with a disability (YLDs) due to prevalent cases of the disease or health condition in a population.

2. Collins and Radley, Cost of Employer Insurance, 2018.

3. Sara R. Collins et al., “Americans’ Confidence in Their Ability to Pay for Health Care Is Falling,” *To the Point* (blog), Commonwealth Fund, May 10, 2018.

# Marginal Improvements Despite Attempts at Remediation

Attempts to slow the cost curve and improve quality have had limited success. Two levers have been used: the first is shifting the financial burden to the individual in hopes of encouraging more cost-conscious decisions on where and when to seek care. However, individuals lack sufficient information to make those decisions.

- ▶ Enrollment in high-deductible health plans has increased during the past five years, from 20% of covered workers in 2014 to 30% in 2019.

Source: KFF Employer Benefit Survey, 2018/2019

The second lever is government and commercial insurers engaging providers in risk-based contracting where providers are rewarded for reaching established quality goals or penalized. This approach is still relatively new, and results are mixed.

- ▶ The Centers for Medicare and Medicaid sponsor 54 cost management programs; only five show measurable savings.
- ▶ According to the National Association of Accountable Care Organizations, only 52% of ACOs earned shared savings in 2019.

**Disruption and attempts to fix the system have come from outside healthcare. The greatest threat of disruption to primary care is from the retail sector. Amazon is offering home visits and telehealth, and CVS has expanded its HealthHUB to include preventive and urgent care.**

- ▶ “Amazon has signed up multiple companies to its telehealth service, executive says.”  
CNBC June 9, 2021
- ▶ Despite the COVID-19 pandemic, CVS Health said its plan to open 1,500 HealthHub stores by the end of 2021 is on track.

# The Challenges of Data Volume and Utility

Healthcare providers must grapple with both the proliferation of new sources of data at scale and the quality and utility of that data. The new variety and volume of data continue to challenge legacy data warehouses and traditional business intelligence (BI) applications.

- ▶ IDC estimates that on average approximately 270GB of healthcare and life sciences data was created for every person in the world in 2020. The global healthcare and life sciences DataSphere industry vertical represented roughly 7.3% (29.1ZB) in 2020.

Demand for large clinical data sets to support AI requirements is growing by the day. The major technology companies are amassing large data sets in their healthcare cloud offerings through their relationships with health systems. Even the largest healthcare organizations are realizing they need high-quality, large-volume data sets to build and test their AI algorithms.

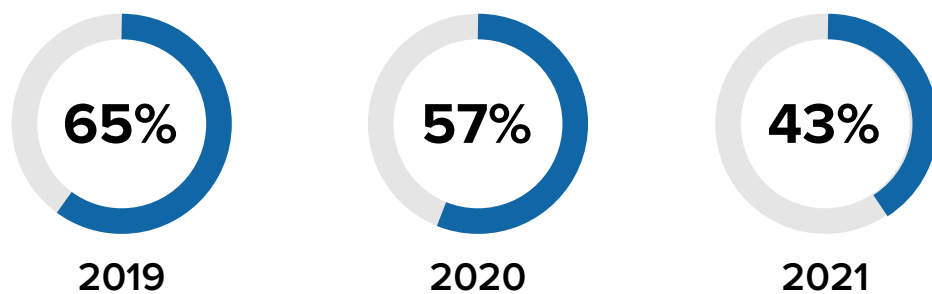
**Only through access to advanced analytics and AI will organizations be able to distinguish the signal from the noise in the emerging big data repositories.**

# Modernizing an Aging IT Infrastructure

Mergers and acquisitions and a risk-averse industry have left healthcare providers with an aging IT infrastructure. The move to the cloud has lagged in part due to the slow migration of legacy applications. However, recent data indicates that apprehension is lessening as healthcare providers take advantage of cloud offerings.

**Investments in modernizing IT infrastructure have occurred with virtually all providers in the past three years and will likely continue into 2022.**

(% of organizations invested)



Healthcare providers are migrating core transaction systems to cloud.

- ▶ 39% of providers indicate their electronic medical records (EMR) application is on the cloud.
- ▶ An additional 20% expect to have EMR on the cloud by mid-2023.
- ▶ 60% of providers indicate their revenue cycle management (RCM) application is on the cloud.
- ▶ An additional 14% plan to have RCM on the cloud by mid-2023.

Additionally, 31% of providers currently have analytic applications on the cloud, with an additional 21% expected by mid-2023. Workloads are hosted as follows:

- ▶ 14% use the public cloud exclusively.
- ▶ 19% use the private cloud exclusively.
- ▶ 14% moved from a public to private cloud.
- ▶ 36% moved from a private to public cloud.
- ▶ 17% use a hybrid cloud.

Sources: IDC's *Worldwide Industry CloudPath 2021*, May 2021  
 IDC's *Connected Health and Value-based IT Investment Plans Survey*, February 2019



# Data Management Is a Valuable Strategic Element

As healthcare providers contend with new and different data sources and analytic use cases, the need for strong data management is critical. Data types include structured and unstructured data, clinical and financial data, and claims, all of which indicate the breadth of analytics use cases and required technology. The adoption of AI raises issues of ethical use and bias that require data management.

- ▶ Over 35% of providers use 10 or more data sources.
- ▶ Over 80% of data in healthcare is semistructured or unstructured.
- ▶ 50% of providers will increase their spending on external data.
- ▶ In AI deployment, 68% of providers ranked ethics considerations as a 4 or 5 (on a scale where 1 is least challenging and 5 is most challenging).

Sources: IDC's *Connected Health and Value-Based IT Investment Plans Survey*, February 2019  
IDC's *Industry AI Path 2021*, May 2021

**Respondents to an IDC survey across all industries indicated that more than 50% of time is spent on data preparation for deployment of AI models.**

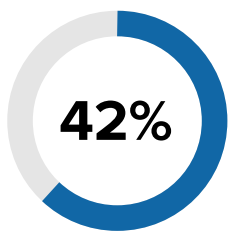
# Ways to Approach Data Governance

Healthcare providers lack analytics and data governance strategies. The result is a proliferation of point solutions, inconsistent data quality processes, and limited internal support for end users.

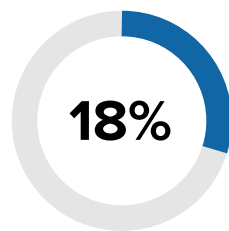
IT departments support the individual data needs of each application, creating inefficiencies and redundancies. As organizations begin to view data as an asset rather than a cost, they are paying more attention to how that asset is managed.

The focus on data and analytics is moving beyond reporting. The industry is seeing the emergence of titles like chief data officer or chief digital officer. The title of chief medical information officer has been adopted by most healthcare providers.

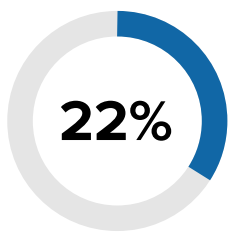
Across all industries, AI is managed through centers of excellence (COEs) or a combination of a COE and business units.



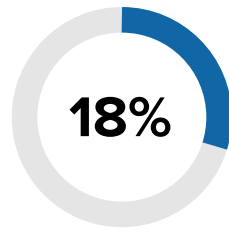
through central COEs



as a spoke (business unit) and hub (COEs)



at the business unit level



independently at the business unit/functional area including payment, model building, and maintenance



Sources: IDC's *Connected Health and Value-Based IT Investment Plans Survey*, February 2019  
 IDC's *Industry AI Path 2021*, May 2021

# The Silos of Data and Democratization of Access

Data silos in healthcare provider organizations limit analytics to discreet structured reporting and analysis, typically at the line of business.

As years of mergers and acquisitions in the healthcare provider market continue, organizations need to consolidate reporting across the enterprise, which in some cases exceeds 20 hospitals and hundreds of provider groups. Breaking down data silos and providing access to data across the enterprise is critical.

The lack of interoperability standards and skills has held healthcare back from creating a consolidated longitudinal patient record. Even more complex is incorporating external consumer data such as finances, taxes, housing, and other characteristics.

**Establishing and navigating a path forward requires consolidated, enterprisewide data with universal access.**



# Healthcare's Readiness to Become Data Driven

Healthcare lags behind other industries in its investment in and advancement of analytics for decision making. For years the industry focused on meeting external/regulatory reporting requirements.

Now, intense pressure to manage costs and improve clinical outcomes is driving decisions to be based on data and analytics. Healthcare provider organizations are beginning to understand what it means to be “data driven.”

**Few healthcare organizations are using data for decision making.**

**Only 18% of healthcare provider organizations versus 33%**

across all industries indicated they were using, to a great extent, quantitative data for decision making that demonstrated improved outcomes (5 on a scale where 1 is least and 5 is greatest extent).

**BUT**

**Data availability is a driver of IT modernization.**

**39% of providers**

indicated they were investing in IT modernization in order to break down data silos, resulting in higher levels of data availability and reliability across the enterprise.

Sources: IDC Data Culture End User Survey, 2020  
IDC's Connected Health and Value-Based IT Investment Plans Survey, February 2019

# What Does a Data-Driven Culture Look Like?

Healthcare organizations are typically behind other industries in terms of IT, so one can expect healthcare to be behind in cross-industry benchmark data. A data-driven culture has an established organizational structure for data management and governance with explicit accountability and authority for data quality and access (e.g., chief data officer, chief analytics officer).

- ▶ Only 45% of organizations across all industries have a chief analytics officer.

Healthcare has particularly complex data from heterogeneous sources. Data quality is among the challenges that hold back organizations from adopting AI. Key to a data-driven culture is the ability to integrate data and draw insights.

- ▶ Today, 82% of organizations across all industries are integrating 10 or more data types into their analytics environments; only 10% had that level of data variety in 2018.
- ▶ Only 19% of organizations across all industries have an enterprisewide data integration and intelligence strategy.

Almost every provider (99%) would hire individuals to develop and operationalize AI and machine learning algorithms. Among the roles: data scientists, machine learning engineers, and data architects. These individuals must have an environment that allows them to use their skills efficiently, deliver actionable insights, and bring value to the organization.

Sources: IDC's *AIPath Survey*, May 2021; base = all respondents, data not weighted  
 IDC's *Data as a Service Survey*, November 2020; North America n = 300  
 IDC's *Data Integration and Integrity End User Survey*, 2019; n = 300  
 IDC's *Business Intelligence and Analytics Survey*, February 2020; n = 310

**To create a successful data-driven culture, healthcare providers must identify staff with responsibility for data quality and data access. The data management team consists of individuals with expertise in data forensics, data science, and advanced analytics. Ideally, some team members also have clinical and epidemiological skills.**

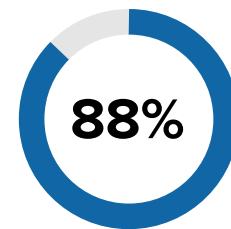
# Operationalizing Machine Learning and Artificial Intelligence

Healthcare organizations need an AI and analytics infrastructure that simplifies and democratizes access to the growing volume and variety of data across a broad constituency of users.

Most healthcare organizations struggle to meet demands for routine business intelligence and analytics, much less the needs of data scientists. Data scientists need access to data and tools without the delays caused by moving data or having to down sample and learn new modeling tools. Often, they cannot leverage models built in other environments.

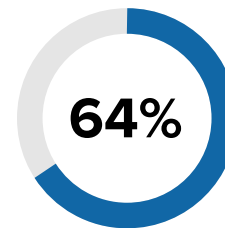
The AI and analytic infrastructure must support both business intelligence and machine learning (ML). Unified analytics provides data scientists access to data on demand in an in-database ML environment that addresses many of today's barriers to operationalizing ML.

## The healthcare industry's approach to AI:

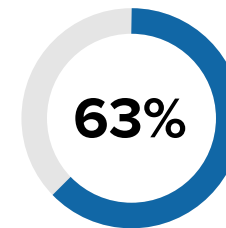


of healthcare providers indicated AI was a priority or had an enterprise strategy in place.

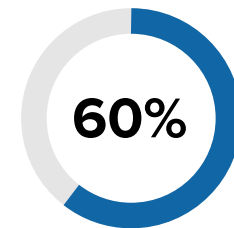
## Respondents were asked to rank challenges in operationalizing AI and machine learning on a scale where 1 is least challenging and 5 is most challenging:



identified the lack of individuals with data science skills as a 4 or 5.



indicated lack of access to compute resources as a 4 or 5.



identified data quality and quantity as a 4 or 5.

Source: IDC's *AIPath Survey*, May 2021; base = all respondents, data not weighted

# Criteria for an Artificial Intelligence and Analytics Infrastructure

The fragmentation of data, analytics, and AI technology can only be mitigated through the development of an AI and analytics infrastructure that includes:

- ▶ Access to data in any format, streaming and batch, from any source and wherever it resides to support analytics anywhere
- ▶ Support for both business intelligence applications and artificial intelligence and machine learning with zero latency
- ▶ Access to a rich ecosystem of tools and technologies for analytics and model building and testing, including ETL tools, analytic tools such as Python and SQL, and BI visualization
- ▶ Resides on any infrastructure to leverage existing investments and policy decision for data storage



# Essential Guidance

There is no greater challenge for healthcare and life sciences organizations than ensuring that their digital transformation along with better data management will accelerate improved patient outcomes, increased operational efficiency and productivity, and better financial results.

- ▶ Make a corporate commitment to become data driven, including demanding data for decision making and as a key metric in MBOs.
- ▶ Build KPIs into management MBOs that are consistent with becoming a data-driven organization.
- ▶ Establish and fund governance and management structures.
- ▶ Create support systems (people, processes, accountability, expertise) for operations.
- ▶ Invest in an AI and analytics infrastructure that leverages existing investments in infrastructure and analytic tools.
- ▶ Evaluate skills gaps and determine whether to train or outsource missing skill sets.
- ▶ Be realistic about the need to hire, outsource, and/or procure needed services.



# About the Analyst



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Cynthia Burghard is a research director with IDC Health Insights where she is responsible for the value-based healthcare practice. A key focus of her research includes the use of cognitive/AI technologies to advance digital transformation in healthcare. Areas of research include analytics, population health workflow, and proactive patient engagement, including patient personal assistants.

[More about Cynthia Burghard](#)

# Message from the Sponsor

As data continues to grow in volume, variety, and velocity, accessing and leveraging all of that data for analytics will be critical for success in the healthcare industry. Vertica is the unified analytics platform helping providers, payers, healthcare technology companies, and medical device manufacturers transform their data into insights. Vertica features the broadest set of analytical functions, and in-database machine learning removes many common barriers to operationalizing predictive analytics. Vertica runs in the cloud, on-premises, and in hybrid environments, so healthcare companies can address critical business and operational challenges with insights based on all of their data.

**For more information, visit [www.vertica.com/healthcare](http://www.vertica.com/healthcare)**

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