



A Call to Action for the Digital Transformation of Healthcare

Why a successful digital-first strategy requires a comprehensive cloud data strategy

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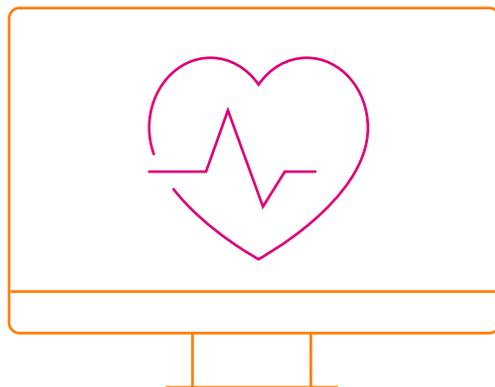
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What a Digital Future Looks Like for Healthcare

The healthcare of tomorrow will be more accessible, distributed, resilient, and efficient

Modern-day events are highlighting important lessons regarding healthcare delivery and the healthcare industry's essential role in society. We are simultaneously inspired by the heroism of healthcare professionals and other frontline caregivers and dismayed by the frailty of our healthcare system and its difficulty in behaving in a coordinated and orchestrated manner.



The healthcare system of the future must operate as an integrated whole at all levels—regional, state, national, and even global. We must fundamentally rethink how we engage with citizens, members, and patients to promote health and deliver high-quality care that is more efficient, accessible, and equitable. Traditional healthcare participants must reinvent themselves; retail pharmacies and similar organizations must assume a much bigger role as enablers of new care models and digital care; and we must encourage digital startups that use artificial intelligence and machine learning to extend new levels of care to consumers with “always on” smart applications and in countless other ways.

Automated intelligence in healthcare could save the U.S. healthcare economy up to **\$150 billion annually by 2026**, and can improve clinical decision-making, reduce administrative costs, and enable more personalized and effective care.¹

A 2021 article published in the Journal of the American Medical Association cited the potential benefits of using technology-driven innovations such as patient portals, electronic health records and data analytics to improve patient care. It also highlighted the importance of engaging patients and providers in the design and implementation of these technologies to ensure their success.³

Healthcare organizations are reporting considerable progress and positive ROI from their AI-enabled technology investments:



Machine learning **90%**



Natural language processing **65%**



Robotic process automation **60%²**



What a Digital Future Looks Like for Healthcare

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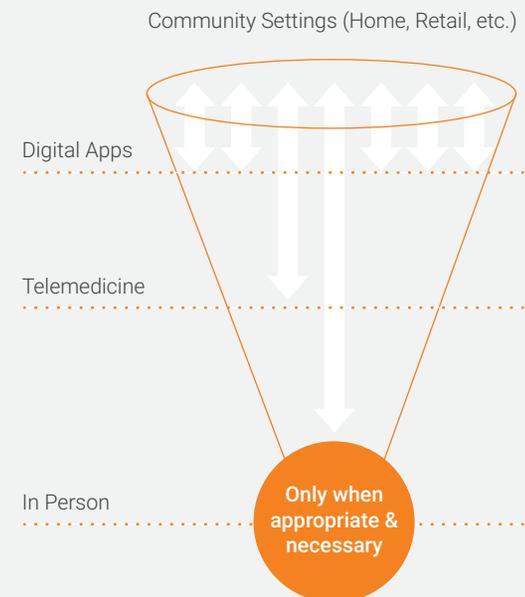
This vision for the future of healthcare will not happen by accident or business as usual. Healthcare executives must act with urgency to design and create the healthcare system of the future.

Pushing Care Provision Outward with Digital Technology

A digital-first strategy pushes every interaction to digital consistent with quality of care, standards of care, and patient preference. This fundamentally transforms and extends how healthcare providers engage with their patients and how health plans engage with their members. It provides the following benefits:

- Enhances patient access by expanding capacity through new channels of care
- Makes possible comprehensive population health and wellness initiatives through digital interactions
- Improves quality of care, reduces costs, and increases satisfaction through frequent digital touch points with highly engaged consumers and providers
- Provides a highly personalized and exceptional consumer experience

Digital-First Healthcare Approach



What a Digital Future Looks Like for Healthcare

(continued)

The new model must exhibit four key characteristics

We need to disregard decades of precedent—where the healthcare system organized around payment rules and perpetuated established in-person and siloed services—and reimagine a new model of care, crafting a system of payment that appropriately compensates participants for their roles. This transformed healthcare system must exhibit four core characteristics:

Accessible: We must ensure that high-quality, cost-effective, and efficient care is available to everyone in a timely manner. We must overcome longstanding shortages of physicians and other care providers while simultaneously addressing the widespread disparities in access to care and variances in outcomes experienced by minorities and those without the financial means to pay for their care. We must move aggressively to adopt technologies for telemedicine and digital care. And we must energize the startup community to automate processes that engage individuals in wellness and chronic disease care and that perform triage at a distance for acute conditions.

Distributed: We must deliver the appropriate care, in the right location, using the best mechanism, be it in-person or remotely via virtual tele-health or other digital means. In this manner we will dramatically increase capacity by optimizing scarce, highly skilled resources and expand our ability to interact with more people. Technology is enabling us to move away from offering facility-based care exclusively by augmenting it with digitally delivered remote care.

Resilient: We must be prepared to respond to surges in demand resulting from challenges such as localized natural disasters, national health emergencies, or incidents of global scale. These events range from the predictable, such as seasonally occurring hurricanes in the Gulf states, to the unexpected, where the healthcare system must be able to dynamically respond. Resiliency primarily includes the ability to move care capabilities from one physical location to another and from physical to virtual locations; and to quickly collaborate and coordinate with other organizations.

Efficient: We must be able to achieve best quality using only appropriate and necessary resources. Efficiency has the dual benefit of increasing capacity—without a commensurate increase in resources—and minimizing the expense of care delivery. Digital solutions have the potential to dramatically reduce the administrative and care delivery costs of our current system by moving care interactions from physical healthcare facilities to virtual or digital realms and by dramatically expanding wellness activities to prevent chronic disease or mitigate acute episodes. In many other industries, digital transformation already automates routine and predictable tasks, freeing scarce, highly skilled resources to focus on the most challenging cases—and healthcare must move aggressively to do so as well.



What a Digital Future Looks Like for Healthcare

(continued)

The Six Tenets of Digital Transformation



Drive interaction costs to zero. Digital must be pervasive and omnichannel. To be pervasive, each digital interaction must effectively be without cost. For example, think how modern ecommerce sites function for orders: chatbots handle questions and provide support, and AI drives many complex interactions without human intervention.



Scale quickly without limits. Moving from resource-intensive in-person interactions to digital interactions will purposefully increase the number of interactions, the people who can interact, and when and where these interactions can occur. All these factors mean we must plan for success and be ready to scale quickly.



Enhance accuracy and efficiency through automation. Digital processes lend themselves to automation when and where automation is appropriate. Processes that have been automated can be far more consistent across channels than equivalent manual process, and can augment physical staff with improved AI-guided decision-making.



Eliminate geography as a constraint. Eliminating physical interactions wherever possible (and appropriate) expands the time and locations where your patients, members, providers, and employees can interact. This leads to more interactions when and where appropriate to enhance outcomes, improve the consumer experience, and enhance efficiency.



Use mass personalization to drive engagement. Digital interactions create and consume data by their nature. This dependence on data provides the opportunity—and the obligation—to use this data along with AI to create omnichannel consumer experiences that are highly personalized to the individual's history, their interests, and the outcome or behavior desired from the interaction.



Make data portable and sharable via interoperability. Digital solutions are more engaging and valuable when built on comprehensive data. The accurate, reliable, and trustworthy data these solutions consume and create is “interoperability-ready” and should be shared when and where appropriate.

The Role of Data as a Catalyst for Digital Transformation

Data managed as an enterprise asset will transform healthcare and open the door to new possibilities

Anyone who has been involved in healthcare for any amount of time is familiar with the data challenges facing our industry. Healthcare data is mind-numbingly complex, with literally millions of different concepts and terms; application and data silos are everywhere and proliferating; poor data quality (missing, incomplete, inaccurate, etc.) is pervasive and thwarts efforts to promote analytics self-service; and interoperability—the sharing of critical healthcare data between care delivery organizations and others for the patient’s benefit—has been essentially impossible. Our inability as an industry to solve our data quality and interoperability challenges has created an enormous barrier to the digital transformation of healthcare.

The way to remove that barrier is to manage data as an enterprise asset. This is not just a buzz-phrase to be tossed around like all the other trendy rhetoric pervading our data management lexicon. Managing data as an asset should

resonate with healthcare clinical and business leaders because they intuitively understand what managing an asset means, be it money, people, or some other resource.

Just as we have a chief financial officer who oversees disciplined processes to ensure proper financial controls are carried out, we need an executive focus on processes and controls to ensure enterprise data is inventoried, cataloged, and managed to be reliable and trustworthy. There is promise that the chief data officer—or a similar leader—can play this role, so long as they are given the same authority and resources to get the job done as their more-established C-level counterparts.

Nobody will argue that managing money as an enterprise asset requires serious resources and commitment. Data is arguably a more challenging asset to manage because the same data can be duplicated and exist in many different places: Data can be combined and manipulated to create new data, and new

sources of data can and do “just arrive.” In addition, data is governed by complex regulations and privacy rules, particularly in healthcare, and the volume of data and the number of data sources are growing exponentially.

Given this complexity, the temptation is to simply declare data too difficult to manage and accept the chaos that currently exists around healthcare data quality and interoperability. This attitude cannot stand. ***We will never realize the potential of healthcare digital transformation if we do not manage healthcare data as an asset.***

The good news is that data management solutions have matured tremendously over the past half-decade. The application of artificial intelligence and machine learning to data management tasks makes it possible to perform activities that in the past were simply too complex and manually intensive to be done at enterprise scale.



The Role of Data as a Catalyst for Digital Transformation (continued)

End-to-end transparency is the key to trust. I can disagree with your conclusion but can still trust you—if you are completely transparent in how you arrived at your answer.

You will know you are managing data as an asset when:

- ✓ Your response when an analysis or report produces an unexpected result is, “What do I do with this insight?” rather than, “That data can’t be right!”
- ✓ There is end-to-end transparency into the lifecycle of data from data source to data consumer, so that questions of provenance can be answered in seconds or minutes, not days, weeks, or months.
- ✓ Every data element and every analytic result in a report or on a dashboard is clearly and unambiguously defined with a common meaning understood across the enterprise.
- ✓ You can establish new data sharing agreements with third parties—to either share or receive data—in minutes or hours, rather than the months currently required.
- ✓ The use of data is directly tied to regulations and policies that dictate how data may be acquired, stored, consumed and disposed of.
- ✓ Data can be consumed as a utility—plug in and begin using it immediately, rather than having to perform lengthy profiling and quality checking before you can get to work.

Health and Human Services (HHS) has Broken the Interoperability Barrier

HHS ruling disrupts healthcare: let the data sharing begin!

Interoperability and the right to share patient and member data between healthcare organizations—and between healthcare organizations and third-party application developers—is long overdue and desperately needed. Much as the Health Information Technology for Economic and Clinical Health (HITECH) Act and meaningful use broke through decades of industry inertia to force the adoption of electronic health records (EHRs), the new Interoperability and Patient Access final rule from the Centers for Medicare & Medicaid Services (CMS) and Office of the National Coordinator for Health Information Technology (ONC) interoperability rules will move the entire industry to an interoperable future.

CMS and ONC have established what data must be shared, how that data must be shared, and— perhaps most important—have enabled the patient to decide with whom their data gets shared.

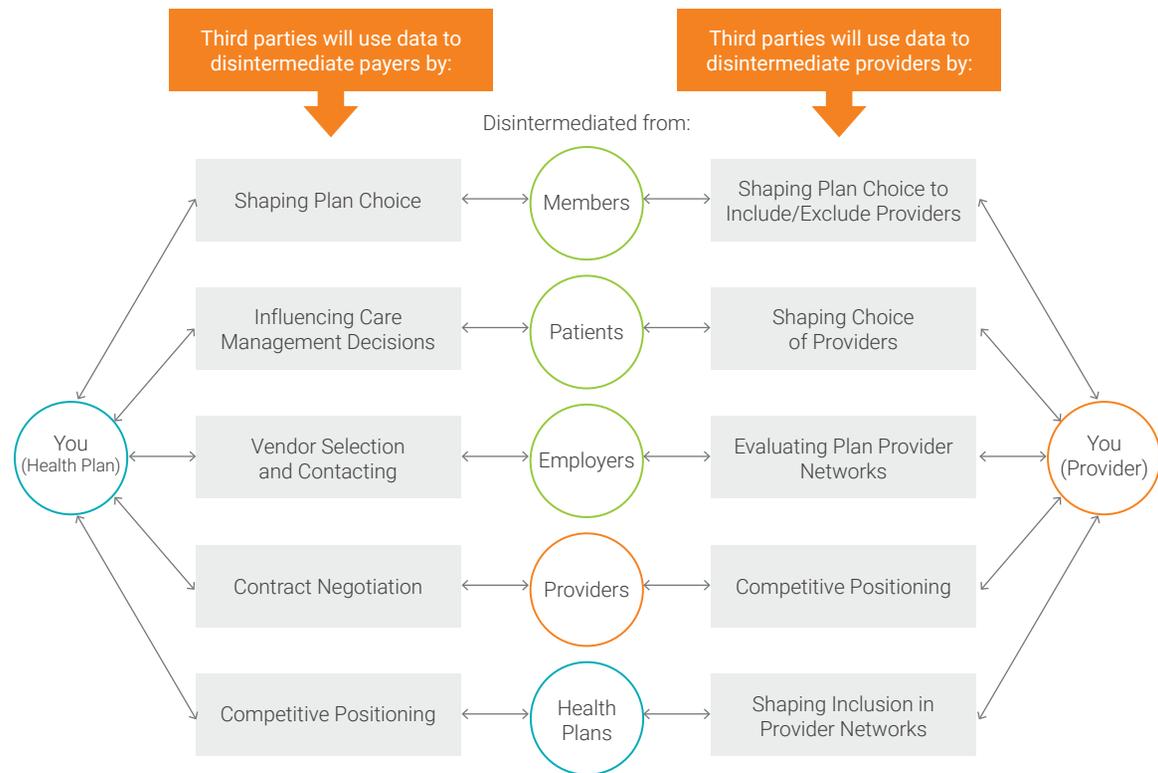
The data blocking rule alone holds the potential to be a game-changer for the healthcare industry. HHS has prohibited by rule anti-competitive behaviors that had effectively locked data within vendor systems. This is a huge step forward in liberating data from these vendor applications, making the data accessible for much broader use by the vendor's own customers and for consumption by third-party applications that will be the engine of innovation going forward.

Do not view the CMS and ONC interoperability rules as a compliance mandate, but rather a first step toward a radically interoperable healthcare future. The capabilities described are wonderful examples of the things a transformed digital healthcare enterprise must be able to do—and do quickly and easily. There are no technology limitations to sharing member and patient data in the manner mandated by CMS and ONC—the technology solutions are widely available, and the data management architectures are straightforward.

Health and Human Services (HHS) has Broken the Interoperability Barrier (continued)

The CMS Interoperability rule has a stated intent of “unleashing innovation” by liberating patient data from health plans and providers and sharing it with third parties when told to do so by the patient. It is anticipated these third parties will use this data to create digital apps and other solutions that will provide a new level of transparency into pricing, quality of care, plan design, and provider network adequacy. These new apps will inevitably disintermediate (i.e., come between) health plans and providers and their constituents and shape market behavior outside the traditional control of the health plans and providers. The image to the right depicts a health plan, a provider, and the entities they work with (in the center) and describes the types of disintermediation they can expect from new digital apps.

Data Interoperability: Disrupt Yourself or Be Disrupted



An Executive Perspective on Data Management

Data management is a core business function, not something to be relegated to IT

Successfully addressing data management challenges requires that people who understand the modern digital, data, and analytics competencies needed for success work together. This includes having a shared vision and understanding of a digital and analytics strategy enabled by trustworthy and reliable data. It takes communication between business, clinical, and IT leaders with a clear sense that the data must be effectively leveraged by the entire organization. IT leaders and their teams are there to help deliver healthcare data assets and insights to the organization's clinical and business minds so that they can make the best decisions possible.

Senior clinical and business leaders are focused on delivering high-value services to the market as efficiently as possible. This requires an external focus on patients, members, and consumers, as well as on innovation, to remain competitive. It also requires that they have an internal focus on operations, including facilities, staffing, capacity, and fixed and variable costs. The digital transformation of healthcare means both external and internal priorities will become increasingly digital, whereby in-person interactions and manual processes will be replaced by digital interactions and automated processes.

For clinical and business leaders, the opportunities for digital innovation are essentially boundless. They will not be disappointed—and can set their goals higher than ever before, because the rapid advancement of digital and data management technologies make just about anything possible.

Senior IT decision-makers in healthcare are driven to create and manage agile, scalable, efficient technology architectures that support clinical and business operations. These architectures support mission-critical, always-on processes that are unforgiving of interruptions in service. These same IT leaders have an essential role to play in driving investment in new technologies and innovation.

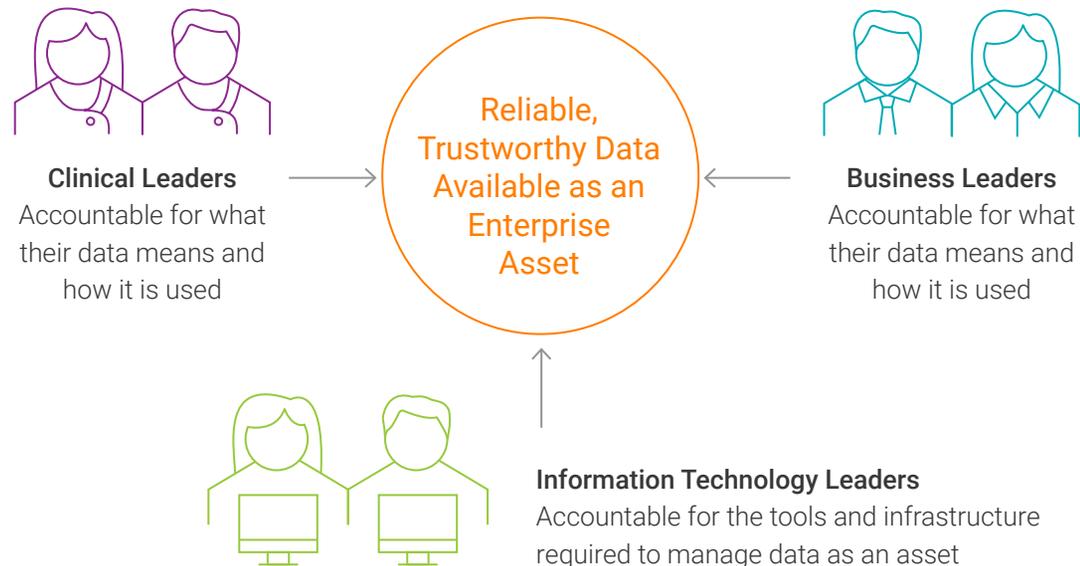
Realizing the digital future of healthcare is a monumental undertaking for IT. It includes managing the proliferation of new data sources and new data consumers; data sharing with third parties and consumer-facing applications; IoT; supporting the development of artificial intelligence and machine learning algorithms for business and clinical decision-making—and countless other challenges.

An Executive Perspective on Data Management

(continued)

Data management is not a technology endeavor. It cannot and should not be relegated to IT with the chasm that too frequently exists between clinical and business requirements and tools, technology, and implementation. The clinical and business areas must be accountable for what their data means and how it is used, since they are the experts. IT must be accountable for the tools and infrastructure required to manage data as an asset. They must also coach their business colleagues on the process aspects of managing data as an asset. This will require an effective data management infrastructure that is fluid, not top-down.

Data must be immediately reliable and trustworthy. Progress will be significantly impeded if every new digital initiative that touches a set of data requires that set to be defined, inspected, profiled, quality controlled, and otherwise “fixed” before it can be used. In contrast, if the data in the enterprise is reliable and trustworthy and immediately consumable for a new digital initiative, then those efforts can move fast, get to value quickly, and be easily integrated into the clinical and business fabric of the enterprise.



Call to Action

- 1. Implement a Buddy System.** Pair influential—and impacted—business and IT leaders to co-drive the delivery of the required outcomes. Their respective teams will ensure the right levels of collaboration, communication, and priority to get the job done.

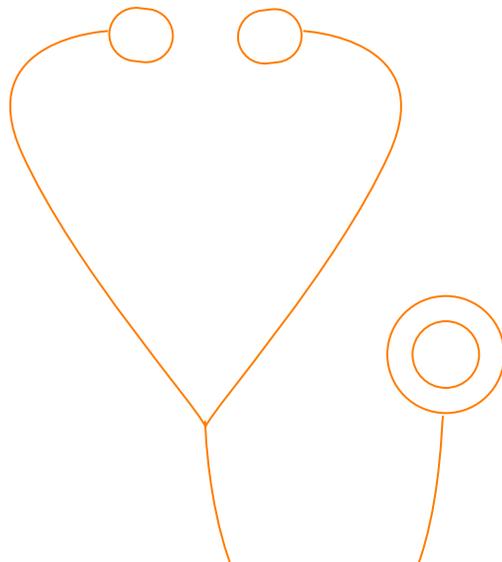
Transformation Requires Collaboration and Accountability

Institutional readiness is required in order to realize the value of digital transformation

As healthcare organizations move to adopt data-driven decision-making, incorporate artificial intelligence to augment or automate administrative and front-line clinical decision-making, and shift aggressively to digital interactions with members, patients and consumers, they need a plan for advancing their digital transformation journeys and treating data as enterprise assets. Creating a data strategy is the first step toward defining and enabling such a plan.

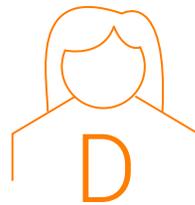
Too often digital transformation has been viewed as a technical endeavor led by IT. This approach seldom succeeds, because digital transformation is an enterprise clinical and business endeavor that is supported, not led, by IT. In response, enterprises should establish a new department outside IT to own “digital transformation” as a clinical and business endeavor reporting to the CEO or other senior executive. But the leadership of this new organization must be harmoniously aligned with IT leaders if progress is to be made.

Healthcare leaders must work hand in hand to revamp their operating models to align their organizational structures with that of an AI-enabled, digital-first organization. This important step requires fostering and implementing a comprehensive data management strategy to successfully derive the greatest value from the data assets available across the organization. We advocate taking a strategic, top-down, holistic approach to adopting an enterprise-grade data strategy so that healthcare organizations smoothly transition to becoming data-driven; however, sometimes grassroots efforts might be required to generate early momentum before everyone is willing to commit their support.



Transformation Requires Collaboration and Accountability (continued)

Begin your healthcare organization's data strategy with the task of identifying the right people to support, sponsor, steward, operationalize, and ultimately deliver a positive return on your data assets. We recommend using a responsibility assignment matrix for your healthcare organization, such as DACI (DACI defines roles of driver, approver, contributor, and informed) to help align and set expectations with the various stakeholders involved in all aspects of your data management effort.



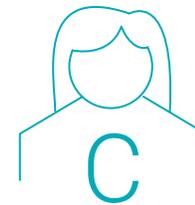
Driver

Who is setting the pace and pushing this forward?



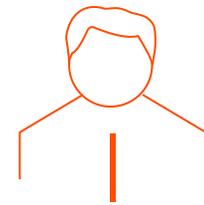
Approver

Who decides the output is acceptable?



Contributor

Who is contributing to the process or output?



Informed

Who needs to be made aware of activity and outcome?



Call to Action

2. **Create clear roles, responsibilities, and accountabilities.** Use a DACI framework to communicate and agree upon these roles across the organization.

Case Study



Improving patient care experiences by enabling trusted, real-time data

Serving over 440,000 people, not-for-profit **Valley Health System** needed a way to more effectively manage and improve patient relationships.

Challenge:

Utilize advancing technology to make better healthcare decisions, increase patient appointments and improve the patient experience.

Solution:

Use Informatica cloud data integration and management to feed data from multiple systems into Microsoft Dynamics.

Results:

Maintained HL7V2 e-messaging standard and reduced the time it takes to complete an API call from 4 weeks to 1 day. They also experienced a 300% increase in patient appointments within a year.

“Before Informatica, it took us about four weeks and our entire integration team to be able to code the simplest of API calls. Now, if I was to try to build a very similar interface using Informatica [cloud services] to do the same thing, it would take me less than a day.”

— **Tom Righela**, Application Developer, Valley Health System

Successful Digital Transformation Needs Cloud

The cloud is the right place for healthcare data

Healthcare organizations have overcome their initial reluctance to move applications and data workloads to the cloud—because the business and clinical benefits are clear:

Increase Business Agility. The fast provisioning of new applications and analytics capabilities in the cloud means that rather than taking weeks or months to stand-up new systems in an on-premises data center, it now takes only minutes or perhaps hours to stand up equivalent—or frequently more powerful—capabilities. It also takes significantly less time to experiment and develop innovative new solutions to business and clinical problems on a cloud platform than on traditional on-premises infrastructure. Cloud ecosystems provide template-based environments for development, testing, and production purposes with increasing levels of operational control. This enables you to experiment quickly for little cost and with low risk, promoting a culture of innovation.

Deliver Performance and Scale. Performance is the ability to do a task more quickly; for example, doing month-end processing in minutes rather than hours by adding more computing capacity when required. Or running a complex predictive model for readmission risk for a patient in seconds rather than days. Scale refers to the ability to do more of a task or support more users using an application. For example, a new mobile application for patients or members growing from thousands of users to hundreds of thousands of users without needing to be redesigned or rebuilt. Cloud supports both performance and scale through “elastic scalability,” which enables you to add processing and storage capacity as needed and to just as easily scale down when the higher level of performance or storage is no longer required.

Improve IT Innovation. Cloud platform providers are continually updating their services with newer technologies, eliminating the need for you to keep up with the blistering pace of technological progress. With cloud-based services, updates and new technology capabilities are added in the background, enabling your knowledge workers to continue to leverage their experience and use familiar tools and digital solutions, and eliminating the time and cost involved in updating on-premises deployments.



Successful Digital Transformation Needs Cloud

(continued)

Avoid Staffing and Retention Challenges.

Modern digital and analytics solutions are powered by complex, sophisticated technologies that are evolving at an almost unthinkable pace. People who know and understand these technologies and can keep pace with their rapid evolution are highly sought after and command compensation commensurate with their skills. Healthcare organizations have difficulty recruiting and retaining the highly skilled staff required to build, implement, and operate these modern digital architectures—but the cloud offers a solution to this challenge. Accessing and using cloud-based services to support business and clinical analytics and processes is easy because they are delivered via self-service and are intuitive for the non-technical team member to operate. Also, many of the most labor-intensive IT processes are automated on cloud platforms, minimizing the need to recruit people for tough-to-fill specialized technical roles.

Strategize in a Multi-Cloud World. The cloud is not a single, monolithic entity. There are multiple household-name cloud platform vendors who serve the healthcare market, along with emerging startups focused on areas such as cloud data warehousing that are born and raised in the cloud and growing rapidly. Each of these cloud providers has particular strengths, so having more than one cloud platform vendor is something to anticipate and plan for. In fact, the vast majority of healthcare organizations are leveraging on average at least 2.7 different cloud platforms.⁴

Multi-Cloud Environment. Microsoft Azure, Amazon Web Services (AWS), Oracle Cloud and Google Cloud Platform are the largest and most recognizable cloud service providers.



Call to Action

- 3. Commit to cloud-first, then get to work.** There's no more time for a pilot or proof of concept. Cloud is inevitable, and it's time to choose your primary cloud ecosystem and implementation partners. Then define your enterprise cloud data architecture and understand all of the competencies required to manage it.

Case Study



Delivering breakthrough therapies with cloud-based innovation

Takeda wanted to improve its operational efficiencies with enhanced data analytics.

Challenge:

Support R&D and commercial and corporate obligations with enhanced data analytics functionality.

Solution:

Replace its data centers – including five repositories, 4,900 mappings and more than 3,500 workflows – with a data lake that could support analytics teams across the enterprise by leveraging Informatica data integration.

Results:

Managed increased data volumes with rapid implementation of a cloud data lake and modernized to the cloud in only nine months. Reduced costs by 40%-50% with no-code auto-scale and auto-deploy.

“Leverage cloud-based innovation where possible. Going with serverless, auto-deploy and auto-scale features definitely saves in costs and achieves operational efficiencies.

– **Shyam J. Dadala**, Enterprise Architect, Takeda Pharmaceutical Company

Artificial Intelligence and Machine Learning Are Drivers of Digital Transformation

Healthcare has massive amounts of highly complex data residing across a breadth of diverse systems—AI-driven automation is the only way to get value from it and to manage it effectively

The Distinction Between AI and ML



Artificial Intelligence (AI)

is the science of algorithms which show “intelligent” behavior to solve problems and complete tasks data.



Machine Learning (ML)

is a subset of AI consisting of the science of algorithms that are able to improve themselves by learning from data.

When the topic of AI comes up in healthcare, the discussion that follows almost immediately addresses clinical use cases, such as automating the screening of disease, augmenting the decision-making of clinicians at the point of care, or creating a predictive model for the efficacy of treatment, among many other things. These are absolutely high-value examples of AI in healthcare. Other good healthcare examples include AI-driven triage bots on a provider or payer’s website and automated administrative functions around claims submissions or processing. Again, these are also great examples of AI-driven capabilities that are essential to driving digital transformation.

If you ask any data scientist what the most important factor is for achieving the goals of an AI initiative such as the examples cited above, they will tell you it is reliable data. Data is used to train the algorithms at the heart of AI, and poor-quality data will result in an AI solution that is less accurate and reliable than it could be—amplifying the impact of the poor-quality data used to create the AI model.

“Reliable” and “trustworthy” are key attributes of data that is managed as an asset—which requires both data governance and the imposition of data quality rules on data. Data governance eliminates ambiguity regarding what data means and ensures that the nuances are documented and understood. Data quality ensures the data itself is understood, complete, formatted correctly, and suitable for the intended use.

However, these clinical and business-facing AI use cases are only half of the picture. Equally important is the critical role of AI in the management of data throughout the enterprise data estate. **We like to say that, “AI needs reliable and trustworthy data, and reliable and trustworthy data needs AI.”**



Artificial Intelligence and Machine Learning Are Drivers of Digital Transformation (continued)

“If we look at the explosive growth in data sources, data volumes, data variety and countless other dimensions of data, it is clear there is no way we are going to simply increase manpower to keep up. We must help our existing staff work smarter, and we must work more efficiently.

The way we do this is to ensure the large volumes of data are fit for purpose by automating data management tasks in much the same way we use AI to automate other clinical and business functions. Rather than having a smart technical resource review recently imported data to cleanse and categorize things such as names, addresses,

dates of birth, and so on, let's instead use AI to do the work. Not only is AI more efficient, scalable, and cost effective, but AI also makes fewer errors and can complete more extensive cross-checking against more data than a human being ever could.

Trusted data is also essential for enabling trusted AI. For customers to build reliable AI models, they need confidence in the data that feeds these models resulting in better predictions, recommendations, and more. These capabilities do not need to be independently procured; rather, they should be seamlessly integrated within the data management capabilities of the enterprise.

Top Outcomes of AI in Healthcare

A recent Deloitte survey of AI use in life sciences globally revealed:⁵



80%

expect AI and machine learning to improve recommendations for patient care and treatment



50%

of global healthcare companies plan to incorporate AI strategies by 2025



Call to Action

4. **Choose where AI and ML can have the greatest transformative impact** in the healthcare enterprise and build a program around delivering on that. The highest impact of data in your enterprise will be driven by AI and ML's use of that data—so AI/ML must be the point of your digital transformation spear.

Artificial Intelligence and Machine Learning Are Drivers of Digital Transformation (continued)

Here are some examples of AI being successfully managed to derive the greatest business and clinical value from healthcare data assets:



Digital Devices Are Enabling Effortless Patient Experience

In February 2020, the US Food and Drug Administration approved the BioIntellisense stick-on sensor, called the BioSticker,[™] for remote monitoring of vital signs with medical-grade accuracy. Just three inches wide by one inch tall, this plastic and metal double hexagon allows for effortless continuous monitoring of vital signs and actionable insights, delivered to clinicians from patients in the home setting, thereby creating unique opportunities for early detection of potentially avoidable complications. Analytics performed on the data sets collected will enable highly efficient healthcare to be made possible at a fraction of the cost of traditional remote patient monitoring.

“We are at the inception of a remarkable new era in healthcare that will employ medical-grade sensor technologies to effortlessly capture remote patient data and generate personalized clinical intelligence.”

— **James Mault**
MD, FACS, CEO, BioIntelliSense

Artificial Intelligence and Machine Learning Are Drivers of Digital Transformation (continued)

Here are some examples of AI being successfully managed to derive the greatest business and clinical value from healthcare data assets:

Detecting Disease Earlier With AI Sensors

The AliveCor KardiaBand, a sensor compatible with the Apple Watch, can detect dangerous levels of potassium in blood (called hyperkalemia) with 94 percent accuracy from a slot on the watch's wristband. When the user touches the sensor, it takes a reading of the electrical activity of the heart: an electrocardiogram (EKG). Too much potassium interferes with the electrical activity of the heart, and the reading can reveal abnormal heart rhythm and atrial fibrillation. The sensor sends the data to an AI-driven app, which has trained an ML algorithm to spot patterns in EKG readings and detect whether the user



has hyperkalemia. AliveCor, in partnership with Mayo Clinic, is also using the ML-driven capabilities applied to 10 million user EKG recordings to uncover hidden physiological signals to improve heart and overall human health.

Promising Results From Integrating AI With Medical-Imaging

An AI model developed by Google has proven effective at accurately diagnosing breast cancer. Breast cancer screening is an ideal application for AI in medical imaging because large curated data sets suitable for ML-algorithm training and testing are already available. Researchers trained the AI-driven ML algorithms on de-identified mammograms from over 76,000 women in the UK and

15,000 women in the US. The AI was able to reduce the percentage of false positive mammograms by 5.7% in the US and 1.2% in the UK. The study also showed a reduction in false negatives by 9.4% in the US and 2.7% in the UK. The researchers went on to report that the AI system outperformed both the historical decisions made by radiologists who initially assessed the mammograms and the decisions of six expert radiologists who interpreted 500 randomly selected cases in a controlled study.⁶ More clinical trials are required to assess the implications of these results, but this is a promising example of using AI in collaboration with human physicians to diagnose patients.

Case Study



Driving positive healthcare change with self-service analytics

When healthcare IT leaders open up the control of data via self-service access and interactions, and senior business and clinical leaders accept responsibility for how they use their data, then each and every opportunity to interact with a patient, provider, or member becomes another opportunity to collect data that can be used to make better decisions and deliver better experiences and outcomes.

Intermountain Healthcare, the largest healthcare provider in Utah and southern Idaho, is leading the region's transition from fee-based to value-based healthcare.

Challenge:

Intermountain wanted to simplify end-user access to data and reduce redundant reporting by discovering and inventorying data assets across the organization. It also wanted to easily locate, better understand, and efficiently provision all patient-related data across a complex data landscape.

Solution:

Use Informatica Enterprise Data Catalog to scan and catalog data from an Oracle-based enterprise data warehouse and provide user-friendly search capabilities.

Results:

Intermountain helps improve population health in Utah and southern Idaho by providing tools to help people live healthier lifestyles. The organization empowers patients by making it easier for them to access health information, contact their doctors, understand their bills, and receive financial assistance.

“Informatica makes a tremendous difference in the way we’re able to leverage our data to provide better, more effective healthcare.”

– **Michael Beiene**, Director, Data Analytics, Intermountain Healthcare

Think Big. Start Small. Get to Value Fast.

Modern data architectures are nimble and can deliver value quickly—so don't be afraid to dream big

Modern data architectures can be deployed quickly to meet complex healthcare clinical and business needs. In this manner, we can have a big vision of where we are going but start by solving focused problems with projects that can be deployed quickly, get to value fast, and then scale based upon success. This stands in stark contrast to years past, where implementing new digital and analytic capabilities at enterprise scale would cost millions of dollars and take years of debating about tools and architecture before first productive use. This was understandable in the past when the cost of making a mistake in requirements definition or design was so expensive and time-consuming that lengthy planning was justified in trying to avoid any missteps. The agility and resilience of modern digital and data architectures mean that new requirements and mistakes can be quickly addressed—allowing you to focus on delivering clinical and business value rather than conducting years of architecture discussions.

Getting to value fast is not just about the technology but also requires that healthcare leaders be as flexible and nimble in their decision-making as the data management and analytics architectures have become.



Modern data management architectures provide the power and agility to manage all types of data, wherever it may reside and wherever it may be consumed. Similarly, modern analytics architectures in the cloud provide virtually unlimited processing power and unlimited storage in general-purpose constructs that can service a wide variety of analytics workloads, without the stringent design requirements of the past. If a meaningful clinical or business problem can be solved in a few months, it makes little sense to take twelve months or more of meetings to evaluate options, pick tools, plan projects, and conduct other activities.

Think Big. Start Small. Get to Value Fast.

(continued)

It is key for leaders to understand that starting small does not mean implementing a prototype or other form of throwaway solution. In years past, prototyping or pilots were a way of minimizing risk by “trying an idea out” before investing the years of effort required to build the real thing. With modern data and analytics architectures, what you implement by starting small is enterprise-class and can be easily scaled to enterprise workloads—which is one of the key value propositions of deploying in the cloud.

Think big—Have a big vision for what you are trying to achieve, realizing that if you can imagine doing something with data, you can now get it done with modern data management and analytics architectures.

Start small—Find some high-value use cases and solve them immediately. Don’t get bogged down in months and years of architectural planning; that is unnecessary and unproductive if you use modern data management platforms and analytics capabilities deployed in the cloud.

Get to value fast—Identify high-value clinical and business opportunities that will transform the patient or member experience by going digital and have a maniacal focus on solving them. Don’t allow digital initiatives to devolve into yet another architecture milestone-driven technology initiative.

Scale based on success—Once you’re sure you’re solving the right problem, in the right way, and getting the right value, then scale. There should be no need to redesign or rearchitect to scale the implementation.

The ability to start small and get to value fast with solutions that can be scaled quickly means it is possible (and desirable) to deploy solutions

in an iterative manner. Leaders should have a strong preference for action and progress rather than the protracted planning and analysis that characterized data management and analytics projects of the past.

“Integration of AI technology in cancer care could improve accuracy and speed of diagnosis, aid clinical decision-making, and lead to better health outcomes.”

— **Mark Maryland**, Senior Investigator
National Cancer Institute⁷



Call to Action

- 5. Have a maniacal focus on delivering tangible, real clinical or business value—fast.** Don’t allow a project plan to devolve into technical or architectural milestones that delay the ability to deliver true value to the business.

Case Study



Achieving a 360-degree view across the health system

Sutter Health is a not-for-profit network of community-based healthcare providers delivering care across more than 100 Northern California communities.

Challenge:

Build a self-service analytics environment that puts trusted data directly in the hands of decision-makers by bringing together and relating patient, provider, member, location and employee data.

Solution:

Use Informatica Multidomain Master Data Management (MDM) and Informatica Data Quality to create a single, patient-centric view of the organization.

Results:

Sutter Health can now identify the unique people and places, as well as the relationships among the data, and achieve a complete view of all interactions across the health system.

“We can now understand the relationships between individuals and delivery locations, contributing to outstanding care delivery, affordability, and patient satisfaction.”

– **Vijay Venkatesan**, VP of Enterprise Data Management, Sutter Health

Data Governance Drives Efficiency and Scale While Preventing Chaos

Govern only the data that you use, and only to the extent that you use it

Governing your data is the single fastest way to get value from your existing data assets and investments in digital technologies. If you do nothing else called out in this eBook, at least establish a formal data governance program and get on with the essential task of governing your data as an asset. Your healthcare organization doesn't let just anyone manage or access your financial assets, so why is it acceptable that anyone can do anything they want with your data assets?

Data governance is also the single most important aspect of succeeding on your transformation journey to a digital future. At this point in the eBook, it should be clear that the foundation of healthcare's digital future is reliable and trustworthy data. And the way you achieve reliable and trustworthy data is to govern it.

Data governance provides the ability to:

- Know where all your data assets reside, where the data goes, how it's been transformed, who consumes it, and for what purpose.
- Have a common understanding of what data means, who the data owners are, what the quality rules and KPIs are that are relevant to the data, and who decides if data is correct and fit for use.
- Align data ownership, data consumers, and allowable uses to industry regulations and enterprise data policies in such a way that compliance is audited continuously.
- Ensure that data is used and shared in a secure and compliant manner, and with patient consent, an essential criteria in deciding what is appropriate use.

Well-managed data is easy to access and searchable. The more complete, comprehensive, and less biased an organization's data is, the faster and more successful the digital initiatives relying on this data will be. The more reliable and trustworthy an organization's data is, the better the results will be from the AI and ML algorithms that use that data.

Data Governance Drives Efficiency and Scale While Preventing Chaos (continued)

Data governance at scale in the modern healthcare enterprise cannot succeed without AI technologies. The use of AI in data governance is required to accelerate and automate the core data governance processes required to ensure that only high-quality, well-curated data goes into the analytics engines. In the context of data governance, AI contributes the following essential capabilities:

Accelerates governance

- Auto data tagging, data identification and classification.

Spotlights data risk

- Intelligent anomaly detection: flag data quality issues, identify sensitive data, flag outliers or unusual usage pattern for proactive remediation. Detect data duplication and stale data.

Improves operations

- Flag potential operational issues with predictive mining and analysis of log files and auto-correct issues based on past performance.

Simplifies data stewardship

- Machine-driven curation: assignment of business terms to physical data assets and automatic data quality scores.

Automates integration

- Parse and integrate unstructured data from log files and IoT sources.
- Self-healing: automatically adjust to changes in data environments.
- Recommendations: suggest source-target mappings.

Amplifies analytics

- Data discovery: Ease of data search, discovery, and understanding with inferred semantics.
- Data recommendations: Efficient data prep with data selection, data joins, transformations, and next step suggestions. Recommend additional datasets to expand analytics with additional information.



Call to Action

- 6. Govern just enough data to get to value fast.** Start a project, earn credibility, and deliver results fast to build momentum for the next phase of your data-driven digital transformation.

Case Study



Delivering a timely, coordinated response with data governance

UNC Health is a not-for-profit integrated health care system owned by the state of North Carolina and based in Chapel Hill. It currently comprises UNC Hospitals and its provider network, the clinical programs of the UNC School of Medicine, and 12 affiliate hospitals and hospital systems across the state.

Challenge:

Enable self-service analytics for executives and business users, develop a comprehensive data stewardship framework, and embrace a community analytics model.

Solution:

Catalog data assets with Informatica Enterprise Data Catalog, integrating with Axon Data Governance to make cataloged data available and give users a collaborative, shared view of data assets.

Results:

UNC Health data analysts, developers, and architects can now quickly find and understand health care data to easily understand data lineage and expedite impact analysis.

“Having the right tools to enhance data governance really helped our health system provide clear and concise information to help facilitate decision-making.”

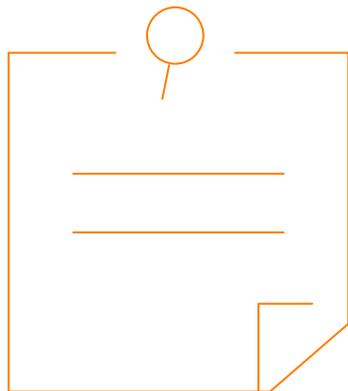
— **Rachini Ahmadi-Moosavi**

Executive Director of Analytical Services & Data Governance, UNC Health

A Roadmap to Healthcare's Digital Future

Get out of the slow lane to data frustration—instead, take the fast track to healthcare data freedom.

We've discussed a lot of initiatives in this eBook; however, the following points can serve as your roadmap. If you focus on these areas, you'll make quick progress in your healthcare data-driven digital transformation. What should you be doing?

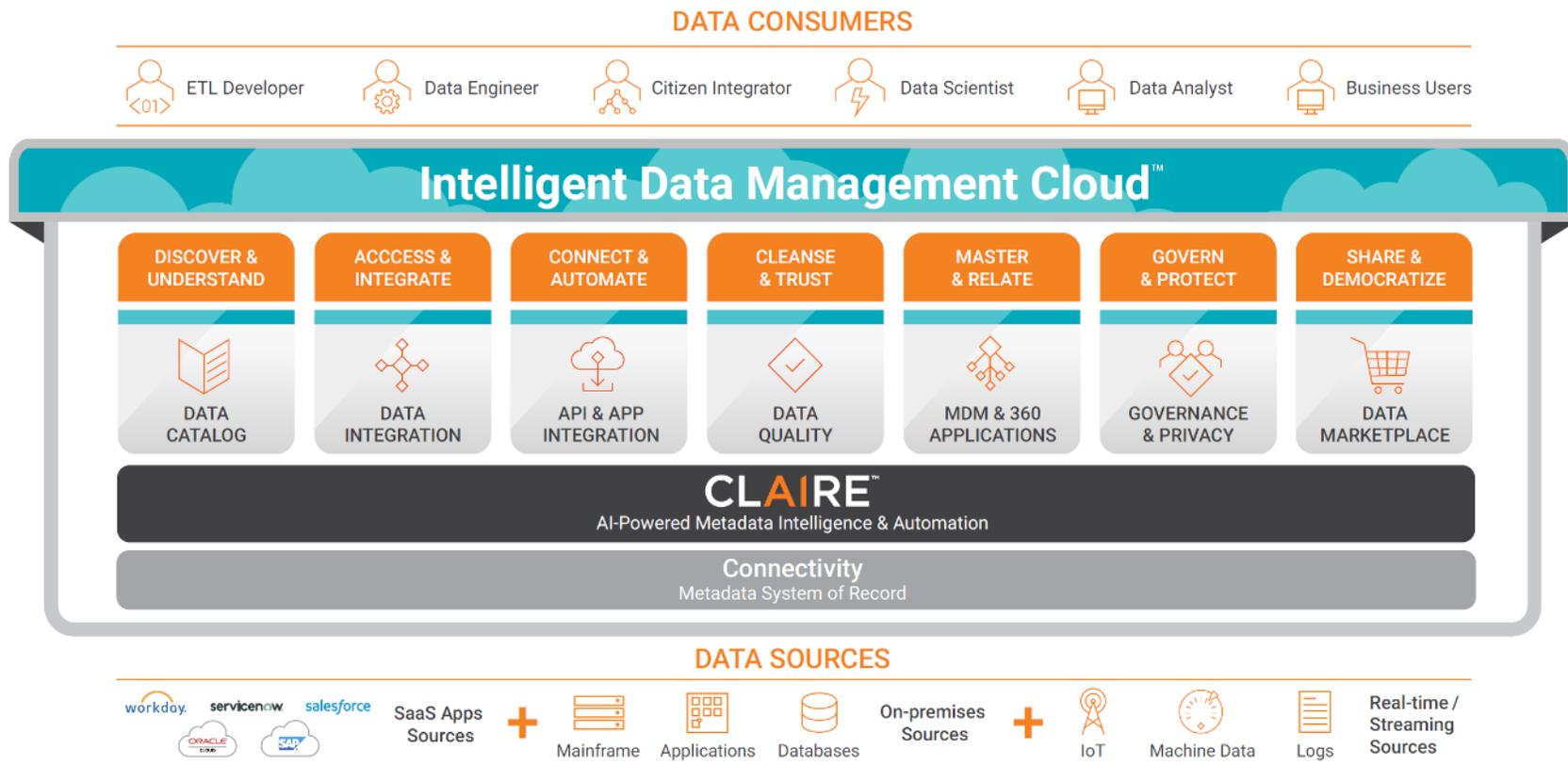


- 1. Implement a buddy system.** Pair influential—and impacted—business and IT leaders to jointly drive the delivery of the required outcomes. Their respective teams will ensure the right levels of collaboration, communication, and priority to get the job done.
- 2. Create clear roles, responsibilities, and accountabilities.** Use a DACI framework to communicate and agree upon these roles across the organization.
- 3. Commit to cloud-first, then get to work.** There's no more time for a pilot or proof of concept. Cloud is inevitable, and it's time to choose your primary cloud ecosystem and implementation partners. Then define your enterprise cloud data architecture and understand all of the competencies required to manage it.
- 4. Choose where AI and ML can have the greatest transformative impact** in the healthcare enterprise, and build a program around delivering on that. The highest impact of data in your enterprise will be driven by AI and ML's use of that data—so AI/ML must be the point of your digital transformation spear.
- 5. Have a maniacal focus on delivering tangible, real clinical or business value—fast.** Don't allow the project plan to devolve into technical or architectural milestones that sidetrack the goal of delivering true value to the business.
- 6. Govern just enough data to get to value fast.** Start a project, earn credibility, and deliver results fast to build momentum for the next phase of your data-driven digital transformation.

A Roadmap to Healthcare's Digital Future

(continued)

The Informatica® Intelligent Data Management Cloud™ is the industry's most complete and modular enterprise data solution, built on a microservices architecture to help healthcare organizations unleash the power and value of all data across the hybrid enterprise. The AI-driven platform spans on-premises, multi-cloud, and big data environments anywhere—ensuring data is trusted, protected, governed, accessible, timely, relevant, and actionable. This enables healthcare organizations to deliver faster and better data-driven digital transformation outcomes.



About Informatica

Digital transformation changes expectations: better service, faster delivery, with less cost. Businesses must transform to stay relevant and data holds the answers.

As the world's leader in enterprise cloud data management, we're prepared to help you intelligently lead—in any sector, category or niche. Informatica provides you with the foresight to become more agile, realize new growth opportunities or create new inventions. With 100% focus on everything data, we offer the versatility needed to succeed.

We invite you to explore all that Informatica has to offer—and unleash the power of data to drive your next intelligent disruption.

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