



# **6 ESSENTIAL INTEROPERABILITY BEST PRACTICES FOR HEALTHCARE**

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# INTEROPERABILITY: MORE THAN A BUZZWORD

Imagine an ailing tourist, far from home, suddenly feeling unwell and needing urgent care at a distant hospital clinic. With a few secure clicks, the attending physician can instantly access the patient's complete medical history or their [patient 360 view](#), including prior diagnoses, medications and allergies. Armed with this information, the doctor can more quickly and accurately assess their condition and start to prescribe appropriate treatments. This easy exchange of information ensures the tourist receives personalized care, regardless of location, transforming a potentially stressful and dangerous situation into a manageable and reassuring experience. That's the power of data interoperability.

## FACTORS ACCELERATING INTEROPERABILITY

The “patient 360” view is no longer a future goal, but increasingly an expectation in modern healthcare. It's made possible by seamless, secure data sharing or interoperability across platforms and systems. But interoperability has many other important applications, including reducing administrative burden, optimizing resource allocation, enhancing public health surveillance and facilitating clinical research.

The demand for interoperability has surged alongside recent trends reshaping the healthcare industry. Over the past decade, there has been a growing emphasis on preventative care, outcome-based payment models, and a holistic patient and clinician experience. And then, of course, there is the growing use of AI as a catalyst for improved care and efficiency.

AI's potential in healthcare hinges on the accessibility of comprehensive, accurate data. AI-powered insights depend on interoperability, which enables predictive analytics, personalized treatment plans and faster diagnoses. However, many healthcare systems grapple with legacy infrastructure, hindering scalability and agility, resulting in missed opportunities.

Leading organizations are setting the new standard by turning to modern platforms, consolidating data for seamless sharing, and empowering both human and AI decision-making for better patient and business outcomes.

## KEY AREAS IMPROVED BY INTEROPERABILITY

- **Patient 360.** Data collected from various points on the care journey can create a comprehensive picture of the patient. This view includes clinical and nonclinical data points such as current health conditions, medications, social determinants of health and communication preferences. A critical part of preventive and proactive care, patient 360 is driven by modern cloud platforms that enable seamless and secure data sharing.
- **AI use cases.** By enabling the seamless flow of data — from EHRs and imaging to wearables and genomics — interoperability provides the robust data sets that AI algorithms need to learn and perform optimally. Enhanced data accessibility can fuel a spectrum of AI applications, including optimizing supply chain logistics, fraud detection, predicting demand fluctuations and streamlining resource allocation.
- **Outcome- and value-based care.** By enabling the seamless exchange of data across health systems, interoperability helps improve the services delivered by clinicians, ultimately leading to better outcomes. As a result, it can help advance outcome- and value-based care with consistently positive results.
- **Regulatory compliance.** Compliance and interoperability are not at odds, but in fact, complement one another. Greater interoperability in healthcare can accelerate innovation in data privacy and security by enabling consistent policies across data, and greater access to data can help providers make better-informed decisions.
- **Optimizing workflows.** Interoperability can improve visibility and connectivity for all tasks, task relationships, context and properties across organizations, helping people and technology work more seamlessly.
- **Patient experience.** Interoperability supports a more patient-centric experience. When clinicians have more detailed and up-to-date information about their patients, they provide better care, leading to improved health outcomes and greater patient satisfaction. Additionally, when patients only need to tell their story one time, trust is strengthened through that data transparency, resulting in better patient engagement and care plan adherence.
- **Research.** Interoperable data paves the way for more robust research, particularly for analysis conducted between different data sources, institutions and countries. Data can be pooled across organizations, filling in knowledge gaps, and more quickly generating new medical insights.

# THE STATE OF INTEROPERABILITY TODAY

Governments and healthcare industries around the world are speeding up efforts to achieve interoperability, recognizing its pivotal role in transforming care and how healthcare organizations run. While legislative advancements and technological innovations have propelled progress, there are significant differences in adoption across regions.



## THE UNITED STATES

The United States is witnessing a big push for healthcare interoperability, driven by federal mandates and the growing adoption of digital health. The 21st Century Cures Act and the CMS Interoperability and Patient Access rule have been important, mandating patient access to electronic health information and promoting standardized APIs, particularly Fast Healthcare Interoperability Resources standards (FHIR). Telehealth's surge during the COVID-19 pandemic further emphasized the need for seamless data sharing, focusing on remote monitoring and integrated care. Despite progress, regional variations persist, with larger systems and urban areas demonstrating higher adoption. While most hospitals use certified electronic health records (EHRs), effective data exchange across providers remains a challenge, requiring ongoing efforts to improve data liquidity and address technical and policy barriers.

## CANADA

Canada's pursuit of national interoperability is marked by collaborative initiatives and strategic frameworks. The Pan-Canadian Health Data Strategy (PCHDS) continues to guide efforts toward a unified health data ecosystem, emphasizing secure data sharing. Provincial initiatives, like the MEDITECH Collaborative in Ontario, demonstrate the value of regional partnerships.

These initiatives increasingly focus on data exchange between acute, primary and community care, aiming for an integrated patient journey. The rise of virtual care drives the need for improved data integration, with a focus on patient access. Increased investment in digital health infrastructure supports secure data exchange platforms and standardized data formats. The focus has shifted from provincial sharing to creating a national framework for seamless interprovincial data transfer.

## THE EUROPEAN UNION

The European Union actively promotes cross-border healthcare interoperability through initiatives like the European Health Data Space (EHDS). The EHDS aims to create a secure framework for health data access and sharing across member states. The European Health Insurance Card (EHIC) reinforces the importance of interoperable systems. The EU focuses on standardizing data formats and promoting common data models for seamless data exchange. The EHDS regulation is a key component of the EU's digital health strategy, empowering patients to control their data and fostering a data-driven healthcare ecosystem. Increased funding and harmonized data protection regulations support secure and responsible data sharing.

# TOP 3 INTEROPERABILITY DRIVERS

While government regulations and mandates form the bedrock of healthcare interoperability initiatives, three additional forces are significantly accelerating its progress: the transformative power of AI and ML, the intensifying focus on cost containment and addressing ongoing staffing shortages, and the advancement of precision medicine. These drivers are not only reshaping how healthcare data is managed and exchanged, but they are also fundamentally altering the delivery of care itself.

## INCREASING AI AND ML ADOPTION

After initial hesitancy, the healthcare industry's adoption of AI/ML quickly gained momentum, driven by its ability to deliver real impacts such as alleviating **physician burnout** and **staffing shortages**, reducing costs and enhancing efficiency. AI and ML can also automate the standardization of diverse data formats, overcoming a major obstacle to seamless data exchange. AI-powered analytics can extract valuable insights from unstructured data (X-rays, imaging, physician notes), helping clinicians make more-informed decisions, personalize treatment plans and identify at-risk populations. In addition, AI and ML streamline workflows by automating data exchanges and supporting clinical decision-making. As AI continues to advance, it will play an increasingly critical role in realizing the full potential of interoperability.

## CONTINUED COST PRESSURES AND STAFFING SHORTAGES

A recent **American Hospital Association report** highlights the continued and increasing economic pressures in healthcare. **Persistent workforce shortages**, supply chain disruptions and inflation are driving up costs, while insufficient reimbursements and insurer burdens further erode margins, leaving many hospitals operating on the edge. Given the urgent need for operational efficiency, interoperability is paramount.

The secure exchange of health information directly contributes to reducing unnecessary tests and procedures, minimizing administrative overhead and optimizing the allocation of limited resources. Additionally, interoperability empowers preventive care and population health initiatives, which can reduce the need for costly acute care interventions and lead to long-term savings.

## ADVANCING PRECISION MEDICINE

A substantive shift in treatment approach, precision medicine or personalized medicine changes the longstanding one-size-fits-all model to patient treatment to one where a patient's genetics, lifestyle and environment are factored into their treatment plan. This innovative approach is gaining momentum and has already resulted in powerful new discoveries and approved treatments. But precision medicine relies on bringing together data across the medical ecosystem, including genomic, EHR and social determinants of health, among others, making interoperability an essential element of its success.



# BARRIERS TO INTEROPERABILITY

Understanding the primary challenges to establishing a secure health information exchange across platforms is an important step toward achieving it. With clear insight into these obstacles, organizations can take proactive measures to mitigate impacts and move toward interoperability. Without addressing the hurdles, clinical and business data will remain siloed, creating outdated and stale data, and the impacts will be far reaching. As a result, many organizations will suffer from ineffective care coordination, difficult cost containment, poor patient retention, low patient adherence, and care plan personalization. It will also make it difficult for them to implement successful AI solutions.

## DATA AND TECHNOLOGY

Technical limitations are commonly the primary barrier to obtaining the comprehensive data needed for improved decision-making. On-premises and legacy solutions make scaling data access difficult and costly, limiting the ability to connect to partner, vendor and third-party systems. Although some organizations have moved to cloud platforms to store their data, many haven't enabled cross-cloud and interregional collaboration, further impeding data exchange and the creation of standardized health information exchange systems.

## SECURITY

Healthcare consistently ranks as one of the most targeted industries for cyberattacks. Last year, the **costliest data breaches** were at healthcare organizations. The high risk of cyberattacks and the costly consequences of data breaches create a climate of fear and uncertainty that hinders the development and implementation of interoperability solutions.

## REGULATORY COMPLIANCE

Across the U.S., EU and Canada, strict data security and patient privacy regulations have hampered interoperability progress, because organizations are cautious to adopt new technology. These laws include the Health Insurance Portability and Accountability Act (HIPAA) in the U.S., the General Data Protection Regulation (GDPR) in the EU, and the Personal Information Protection and Electronic Documents Act (PIPEDA) in Canada.

## CULTURE

Digital transformation impacts the entire organization. Unfortunately, many leaders see new technologies as only meaningful to IT departments and focus on potential short-term cost savings. Others may underestimate the value of implementing an effective change management plan, hindering the adoption process. As a result, culture constraints can make the path to successful interoperability a challenging and lengthy exercise.

# 47%

**of healthcare leaders in a recent survey are unsatisfied with the way their organization's manage data quality.**

# 6 BEST PRACTICES TO ACHIEVE INTEROPERABILITY

Human beings are at the heart of interoperability and the technology that facilitates it. Technology simply enables healthcare professionals to deliver on the shared mission of better, more effective care and healthcare leaderships' goals to attain greater operational efficiency and cost savings throughout the business. But the majority of healthcare organizations have legacy and on-premises technologies, making achieving interoperability a challenging, costly, time-consuming and nearly impossible endeavor. Powering interoperability requires highly functional data cloud services and humans ready to activate its potential.

Here are six best practices leading healthcare organizations implement to achieve interoperability.

## 1. LEVERAGE MODERN AI DATA PLATFORMS

Leading AI data cloud platforms are able to address today's modern data management needs and legacy and on-premises technology challenges, such as limited scalability, data collaboration issues and high overall costs.

## 5 AI data cloud platform benefits for healthcare organizations

- **Seamless data sharing and data collaboration:** Today's AI data cloud platforms allow organizations to seamlessly share and collaborate on data with any department, organization, vendor or partner — regardless of the platform, system or public cloud they use. And the data collaboration functionality makes it easy for organizations to quickly share governed and secure data in near real time.
- **Built-in, easy to use and secure AI capabilities:** Modern platforms offer a fully managed, user-friendly and tightly integrated data and AI infrastructure that brings AI to your data in a highly secured environment. This enables the secure and seamless development of AI applications, empowering organizations to fully and confidently leverage their healthcare data.
- **Cost-efficient “pay only for what you use” pricing structure:** Leading data cloud platforms allow data storage and compute to scale independently, so customers can use and pay for storage and computation separately as needed.





- **Security and availability:** Data security is the highest priority for data cloud platforms. Many are SOC 2 Type II-certified (a standard security and risk framework to assess security) and include additional levels of security, such as support for flexible data management and governance models over PHI, PII, or any sensitive information that is managed across the healthcare system, including HIPAA compliance and automated encryption across all network communications. They are also designed to operate continuously and tolerate component and network failures with minimal impact to customers.
- **Performance and speed:** The elastic nature of the cloud means if an organization or department needs to load data faster or run a high volume of queries, they can scale up to take advantage of extra compute resources. Afterward, they can scale down and pay for only the time they used.



## ASK THE RIGHT QUESTIONS BEFORE ADOPTING AN AI CLOUD STRATEGY

Without a centralized strategy for cloud adoption, organizations can experience high costs and compliance and security issues. To avoid redundancy and effectively migrate data operations to the cloud, organizations should address the following questions:

### Vendor questions checklist

Does the platform ensure secure, seamless data sharing and data collaboration across systems and applications?

Is the AI cloud platform a single, fully managed global platform that can integrate data and systems across clouds and regions?

Is the platform's cost structure based on what the organization uses or a flat fee?

Can the AI cloud platform govern data across clouds and regions in alignment with local government and industry regulations?

Does the platform have strong data security features, such as data-level security, encryption, anonymization and role-based access controls?

Is the cloud platform built to easily scale to the organization's changing needs and workloads, including AI/ML, applications and advanced analytics?

### Internal questions checklist

Does your organization see interoperability as a strategic business objective?

Is implementing secure AI solutions a priority for your organization?

Is improving the patient experience a priority for your organization?

Do you view leveraging the cloud as both an IT strategy and a business strategy?

Are stakeholders invested to ensure that interoperability will provide a measurable return on investment?

Does your organization have attainable short-term and long-term goals for leveraging an AI data cloud platform?

## 2. ADDRESS FINANCIAL AND POLITICAL CONSIDERATIONS

Technology is vital to interoperability, but alone, it is not sufficient for facilitating greater data exchange. In fact, financial and political considerations are just as important as selecting the right digital platforms to meet an organization's needs. Before integrating new technologies, it is important to define an overall strategy and get buy-in from stakeholders — making it clear how interoperability will help all more effectively achieve their goals and objectives. This requires ensuring all stakeholders are on the same page and invested in the process, and resources and timing are clearly stated and shared.

Since interoperability implementation requires significant change management, it is critical to set expectations and keep lines of communication open. Companies shouldn't just share long-term goals, but also the details of how they intend to get there. Part of that requires identifying specific use cases, data and workflows, and then preparing teams to make needed changes.

## 3. CREATE A DATA-DRIVEN CULTURE

Healthcare organizations with data-centered cultures are poised to achieve better overall outcomes. With an organizationwide embrace of data, businesses can measure and evaluate many aspects of their operations and judge the efficacy of their efforts and overall return on investment.

Leaders should engage teams regularly to discuss data and its implications relevant to their work. The discussion could include questions such as:

- What are our data strengths and challenges?
- Has our organization or department identified what data we need to improve patient outcomes, facilitate cost savings and enhance member outreach?
- Are key stakeholders aligned on the role of data and analytics in the decision-making process?
- What data points do we need to comprehensively track the impact of our business and patient decisions?
- How are we measuring impact and success using available internal and external data sources?

## 4. ESTABLISH A CENTER OF EXCELLENCE

A center of excellence (CoE) focuses on data and analytics, functioning as a central hub to house data, analytics knowledge and initiatives, and disseminates the learnings throughout the organization. The team provides expertise to unify and accelerate the path to becoming a data-driven organization. Establishing a CoE can help drive the collaboration, communication and framework necessary to deliver results by elevating the importance of data and more effectively turning insights into action.

CoEs can leverage model-driven interoperability, a secure and effective approach to improving cloud interoperability. This framework provides conceptual and technical support for transformation specification, defining how various models can be converted to code.

To be most effective, a CoE must have the following:

- A shared, comprehensive understanding of the needs of the business
- Collaboration and communication across the organization
- A list of terms and definitions

## 4 best practices for creating a CoE:

- **Define goals and objectives:** Ensure all stakeholders understand what the goals are and how they will be measured.
- **Organize your team:** Choose people with valuable skills and experience who will improve data competency.
- **Establish a rhythm and cadence:** Schedule regular meetings to achieve and maintain momentum.
- **Invest in the right technology:** Choose a data cloud platform capable of powering business analytics and scaling as you grow.

## 5. INVEST IN A CHIEF DATA OFFICER

Chief data officers (CDOs) have special skills that bridge the gap between IT and business outcomes. This role is integral in ensuring data is consistent, governed and comprehensible. CDOs typically play a crucial role in leading a data-driven work culture and the operations of a CoE, making the business more agile and connected.

## 5 essential skills for a CDO:

- **Data acumen**
- **Deep curiosity and drive to learn and adapt**
- **Cross-organizational teamwork and collaboration**
- **Empathetic problem-solving and storytelling skills**
- **Risk and governance expertise**

## 6. EVALUATE THE INTEROPERABILITY STRATEGY FREQUENTLY

Convening regularly — bi-annually or quarterly, ideally — to assess the trajectory and success of an established interoperability strategy is crucial to success. It provides a space to discuss challenges, weaknesses and successes, readjusting as necessary. It is an opportunity to discover what departments or operations can become more data-driven and where data is missing.

Both the technological and human aspects of interoperability must be addressed. A good place to start is understanding the functionality of your technology and the organizational processes that support interoperability. The **HIMSS interoperability maturity model** is a valuable tool to help healthcare organizations evaluate where they are on their journey.

### Evaluating technology

There are different layers of data interoperability. For an external system to perform operations based on a data set, they are explicitly built in to ensure functionality and performance.

When evaluating the technology powering interoperability, it's important to address the four layers of interoperability:

- **Foundational:** The ability of one IT system to send data to another and acknowledge receipt of the data payload.
- **Structural:** The ability of one system to interpret the data it received from another system.
- **Semantic:** The ability of health IT systems to exchange, interpret and use information.
- **Organizational:** The ability to execute governance, policy, social and legal initiatives across an organization.

Source: **HIMSS**

## INTEROPERABILITY MATURITY MODEL

| FOUNDATIONAL<br>(LEVEL 1)                                                                                                                    |  | SEMANTIC<br>(LEVEL 3)                                                                                                                                                                                                                                          |  | ORGANIZATIONAL<br>(LEVEL 4)                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Establishes the interconnectivity requirements needed for one system or application to securely communicate data to and from another system. |  | Allows for common underlying models and codification of the data, including the use of data elements with standardized definitions from publicly available value sets and coding vocabularies, thereby providing shared understanding and meaning to the user. |  | Includes governance, policy, social, legal, and organizational considerations to facilitate secure, seamless, and timely communication and use of data both within and between organizations, entities, and individuals. These components enable shared consent, trust, and integrated end-user processes and workflows. |
| STRUCTURAL<br>(LEVEL 2)                                                                                                                      |  |                                                                                                                                                                                                                                                                |  |                                                                                                                                                                                                                                                                                                                          |
| Defines the format, syntax, and organization of data exchange, including at the data field level for interpretation.                         |  |                                                                                                                                                                                                                                                                |  |                                                                                                                                                                                                                                                                                                                          |

Source: **HIMSS**

### Questions to help you evaluate your data culture and interoperability strategy effectiveness:

- What are your department's/organization's strengths and weaknesses when it comes to using data?
- How would you rate your department/organization when it comes to being data-driven? Are there any areas where it could be more data-driven?
- Are there any data-driven culture or analytics "wins" you should celebrate and evangelize to leadership/stakeholders?
- Does your organization/department leverage all the data required to make timely, effective decisions?
- Are stakeholders across the organization seeing the value of your interoperability strategy? Is there any department that sees it as less or more valuable?
- Is there any data or data sets missing that would make your job/your team's job easier?
- Where are you on your journey to becoming a data-driven culture? What are some specific areas for improvement?

# A BETTER FUTURE

Simplifying data access across the healthcare ecosystem can make care more accessible and effective as well as provide much-needed operational and cost efficiencies. Streamlining communication, improving patient satisfaction and reducing costs enhance quality of life and contribute to a more productive and vital healthcare system. As multichannel care, medical devices, and the ecosystem of partners, vendors and patients continue to evolve, we have the opportunity to leverage data to create a healthier world.

The path to better patient and organizational outcomes through interoperability starts with the right data AI data cloud strategy. Learn how Snowflake services the healthcare and life sciences industries through the [AI Data Cloud for Healthcare & Life Sciences](#).





# ABOUT SNOWFLAKE

Snowflake makes enterprise AI easy, efficient and trusted. Thousands of companies around the globe, including hundreds of the world's largest, use Snowflake's AI Data Cloud to share data, build applications, and power their business with AI. The era of enterprise AI is here.

Learn more at [snowflake.com](https://snowflake.com) (NYSE: SNOW)



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