



Unlocking the cloud's promise in healthcare

How Redox helps health systems minimize implementation risk and unlock innovation in Amazon Web Services

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Introduction

With nearly limitless scale, and the capacity to speed development, public clouds like Amazon Web Services (AWS) offer more than just inexpensive solutions for data storage. Cloud services providers may position healthcare organizations to unlock desperately needed innovation to keep pace in a rapidly evolving landscape. AWS enables longitudinal data mining and omnichannel engagement through a suite of tools like Amazon Sagemaker (machine learning), Amazon Quicksight (business intelligence), AWS Amplify (app builder), Amazon Lex (chatbot), Amazon Pinpoint (marketing and communications), and many more. The combination of these services with the right data can help healthcare organizations to compose more personalized patient/clinician experiences, improve outcomes, develop new care products, and enable more targeted marketing.

McKinsey estimates that healthcare systems are positioned to capture as much as \$140 billion in value from cloud-enabled innovation in 2030.¹

With this incredible potential, the decision to head into the cloud is not a difficult one, but many healthcare organizations may not be ready to move their entire technology stack into the cloud. According to recent research, 60% of healthcare IT executives say their organization is taking a hybrid approach to cloud operations — part cloud, part on-premise.² Seamless interoperability and integration management will be critical to this hybrid approach.

1. <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/clouds-trillion-dollar-prize-is-up-for-grabs>

2. <https://www.prnewswire.com/news-releases/healthcare-cloud-computing-market-size-is-set-to-surpass-usd-79-billion-by-2027-301405341.html>

The problem: The complexity of cloud implementation







While the decision to move into the cloud is easy, the process of actually moving is not. Inefficiencies in migration strategies can lead to delays and additional costs, the result is that many organizations are leaving potential value before they even get into the cloud. Data from McKinsey show that migration inefficiencies cost the average company 14% more than budgeted and more than a third of companies experience delays longer than a quarter.³

In healthcare, there may be even deeper complexities as organizations are seeking to extract value from the cloud without disrupting patient care and the day-to-day operations of their legacy electronic health record (EHR) systems. Most provider organizations aren't migrating clinical data from their EHR to the cloud, so much as replicating it to enable the longitudinal data mining and omnichannel engagement capabilities that can fuel innovation. As a result, there are three main hurdles providers are likely to encounter in planning and implementing a move to the cloud:

- 1. Dealing with data in transit:** Providers will need a strategy for backloading historical data from the EHR as well as a strategy to replicate the synchronous data they will continue to generate daily. For many providers, the volume of data for backloading is immense. Getting strategies right the first time is crucial to keeping projects on time and on budget.
- 2. Data translation and normalization:** Providers typically have more than just EHR systems to consider — they are also likely to have revenue cycle and other enterprise systems where data needs to be extracted, normalized, and harmonized with clinical data from the EHR, and replicated in the cloud. All these systems are likely to use different legacy data protocols (e.g., HL7[®]v2, C-CDA, X12, etc.) that are not immediately ingestible into the cloud. In most cases, the legacy protocols need to be translated into the more modern HL7 Fast Healthcare Interoperability Resources (FHIR[®]) protocol which requires in-depth healthcare data knowledge and experience. While many EHRs now offer FHIR support, they do not offer the real-time, on-demand, bi-directional capabilities required to truly unlock innovation, so organizations must look for another solution elsewhere.

1. <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/cloud-migration-opportunity-business-value-grows-but-missteps-abound>

Redox FHIR vs. FHIR support via EHRs

	FHIR support via EHR	Redox FHIR API
Real-time monitoring of patient clinical journey (e.g. patient admission, registration, transfer, and discharge)	 No support	
On-demand patient data (e.g. patient scheduling)	 Variable support outside of USCDI resources	
Bi-directional exchange (e.g. write lab results to electronic health record)	 Limited support, variable by EHR.	

FHIR support via EHRs cannot support real-time, on-demand, bi-directional interoperability

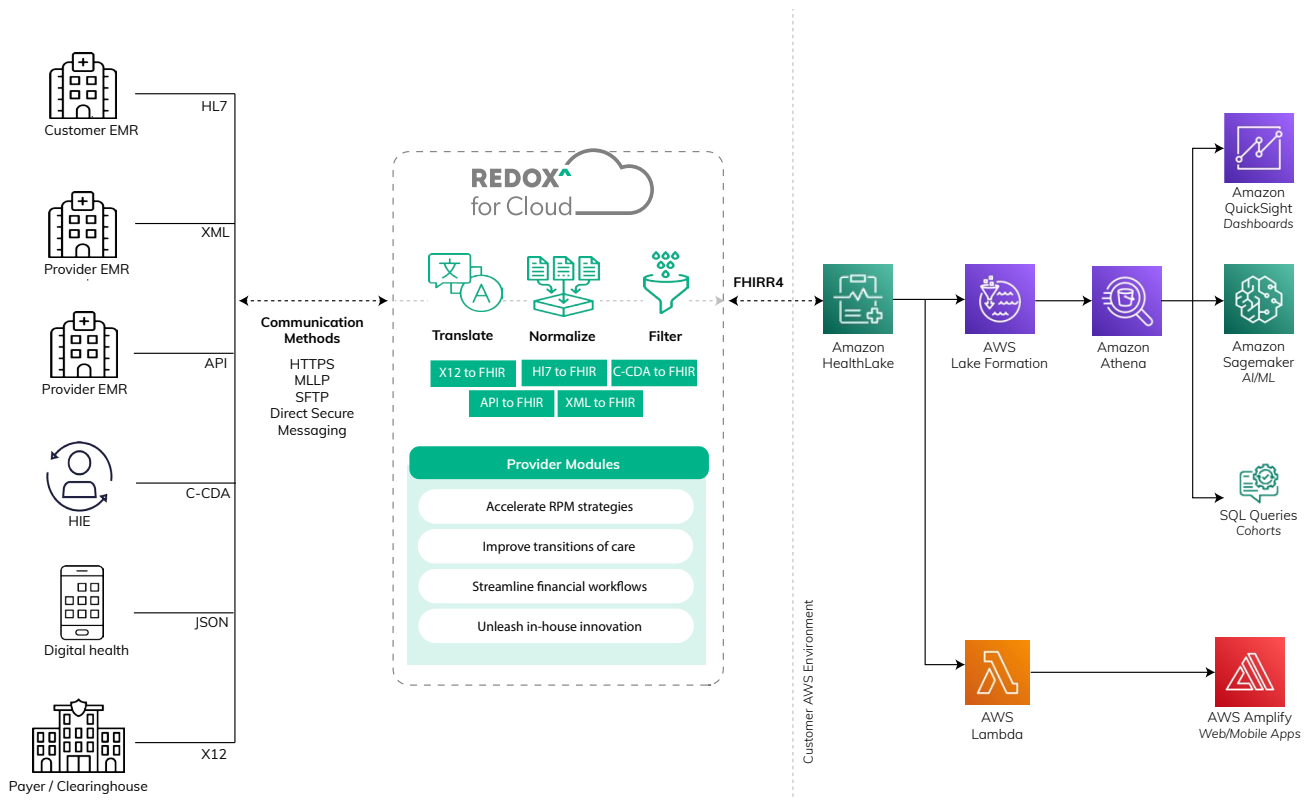
3. Delivering data back to the point of care: Getting data into the cloud is just one part of the equation. To extract full value, providers will need a strategy for getting information and insights from the cloud in front of clinicians and/or patients in a way that is contextually useful either via the legacy systems or newly developed applications. A strategy for bi-directional interoperability between legacy systems, in-house applications, and the cloud is crucial. For example, a health system IT team might create an AI/ML model with AWS services to identify patients at risk for diabetes. Once the cohort of patients has been generated, the IT team will need a mechanism to alert clinicians in the EHR when their patients are a part of the cohort. Finding the right time to intervene, in the right clinician workflow is something that Redox has deep experience in across EHRs.

The solution: Redox for Cloud

The Redox for Cloud AWS adapter helps health systems overcome the key hurdles outlined above by getting data flowing from EHR and legacy systems to Amazon S3 or Amazon HealthLake quickly while also minimizing the risk of implementation delays and cost overruns.

Redox for Cloud is an infinitely scalable engine that is hosted on AWS and is HIPAA-compliant, HITRUST & SOC 2 certified. Redox for Cloud will receive, queue, parse, normalize and filter data from EHRs and other systems regardless of protocol (e.g. HL7v2, X12, C-CDA, etc.), and then translate to JSON or FHIR to route data into AWS. Data can be exchanged bi-directionally, in real-time when clinically relevant events occur.

Redox to AWS architecture



Reference Redox to Amazon HealthLake architecture

When a health system IT Team chooses Redox for its EHR to AWS cloud migration, they will follow an implementation process that has been hardened over the course of more than 5,000 integrations.

Integration strategy

Our team of experts works with the health system IT team to develop an integration strategy that identifies what data types (e.g. patient administration, clinical summary, financial, etc.) need to be replicated from the EHR and other source systems into AWS, how much data needs to be backloaded (if any), and how the ongoing real-time flow of synchronous data will be enabled.

Redox Amazon S3 integration strategy



Reference provider EHR to Amazon S3 integration strategy workflow

Connectivity

Redox will establish connectivity using any existing endpoints to the EHR, which can substantially reduce the effort of the provider IT teams. And, because Redox is already live in over 3,900 provider organizations, chances are we already have connectivity established to your EHR, further accelerating the integration process.

Healthcare organizations on the Redox network

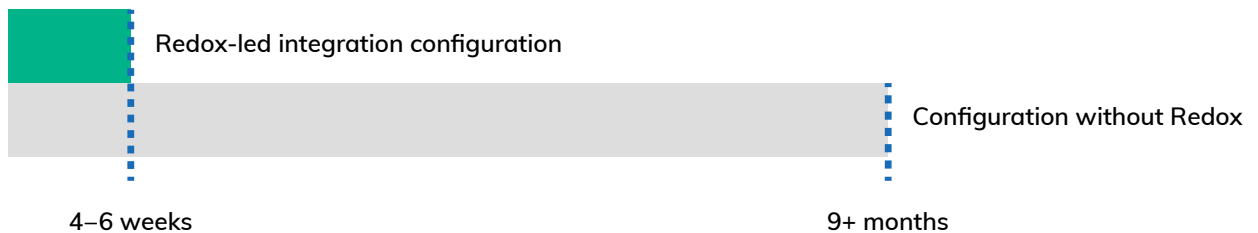


Snapshot of some of the providers on the Redox network. Explore the full list at <https://explore.redoxengine.com/>

Configuration

Redox for Cloud was built on the backbone of our configuration library which contains thousands of configurations across 85 different EHR systems that we have compiled over the course of nearly a decade. This library dramatically accelerates the process of mapping and configuring data from the EHR to AWS (and back again). Our customers have told us that their consulting partners have quoted timelines of 9 months or more to complete just this process — we do it in just weeks.

Redox for Cloud integration configuration timeline



Redox-led integration configuration saves health systems months

Testing and training

Redox's team works with health system IT teams to develop and execute a robust testing and training strategy, ensuring security and mitigating risk. This includes identifying testing scenarios, completing functional testing, end-to-end testing, and communicating setup and workflows to IT end users.

Go-Live and ongoing monitoring

Redox will monitor and provide support before, during, and after go-live. We provide 24-7 monitoring of the health of the connection using an alert system designed to identify connectivity or message delivery issues. We are the first point of contact when there is an issue and will get problems resolved with minimal disruption, leaning on our experience of maintaining integrations across thousands of healthcare organizations.

The result: minimized implementation risks, maximized value

By pairing Redox for Cloud with AWS, our customers are minimizing risk and speeding time to value. They are establishing innovation hubs that help them differentiate from competitors — using Redox-enabled data and AWS tools to compose workflows, products, and experiences that were previously unimaginable and have the potential to transform the patient experience.

A large regional health system is using Redox to connect their Epic EHR to AWS, allowing the real-time flow of a myriad of clinical data into Amazon S3. This data has enabled a hub for innovation — where they are free to compose new experiences for patients and clinicians without wrangling data for each new idea. Their first innovation, a custom application that provides patient access to on-demand services, appointment scheduling, physician messaging, health records, and more is currently in pilot. The hope is that this application helps them pivot to a more holistic model of care without dismantling the current EHR infrastructure or operations. Soon, they anticipate adding new integrations with the EHRs of their specialist provider partners — creating even more complete 360-degree views of their patients, and improved patient referral experiences.

AWS can dramatically increase the pace of innovation and unlock the true potential of patient data, but you must get the data there first. Redox for Cloud AWS adapters will get it there, liberating the true value of your cloud investments and reducing the risks of unexpected cost and/or delay.

If you'd like to learn more about Redox for Cloud AWS adapters and talk to an expert about your potential integration needs and strategy, visit us at redoxengine.com/cloud/aws/ or on [AWS Marketplace](#).

About Redox

Redox is a healthcare data interoperability platform that helps healthcare products access, ingest, and make use of healthcare data. We solve challenges faced at the infrastructure layer so that product teams can direct internal development hours towards intelligence and engagement layer functions. Learn about the different products leveraging Redox's platform at redoxengine.com/healthcare-products/.