



AWS FOR HEALTH:

Unlock Greater
Insights with
**Multi-modal &
Multi-omics Data
Integration &
Analysis**

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The case for multi-modal & multi-omics

Powering the new era of data-driven personalized health

The new era of personalized health relies on data to guide more personalized patient treatments, therapeutics, diagnostics, and patient care.

Across clinical and research disciplines, leading healthcare and life sciences organizations are combining varying data modalities to increase accuracy of diagnoses, reduce turnaround times, and ultimately improve patient outcomes.



34% accuracy improvements¹

In predictive capabilities when leveraging multi-modal data domains (genomics, clinical, and imaging) over a singular data domain (genomics)

[Read the full blog »](#)

PHILIPS

Philips is making it easier for physicians, like those at MD Anderson Cancer Center, to confirm diagnosis and determine optimal therapies for each patient—right in the clinic.

“Using AWS, we have the capabilities to combine disparate multimodal data sets, deidentified and in a compliant way, so we can help our customers drive precision medicine at the point of care.”

General Manager of Genomics and Oncology Informatics, Philips

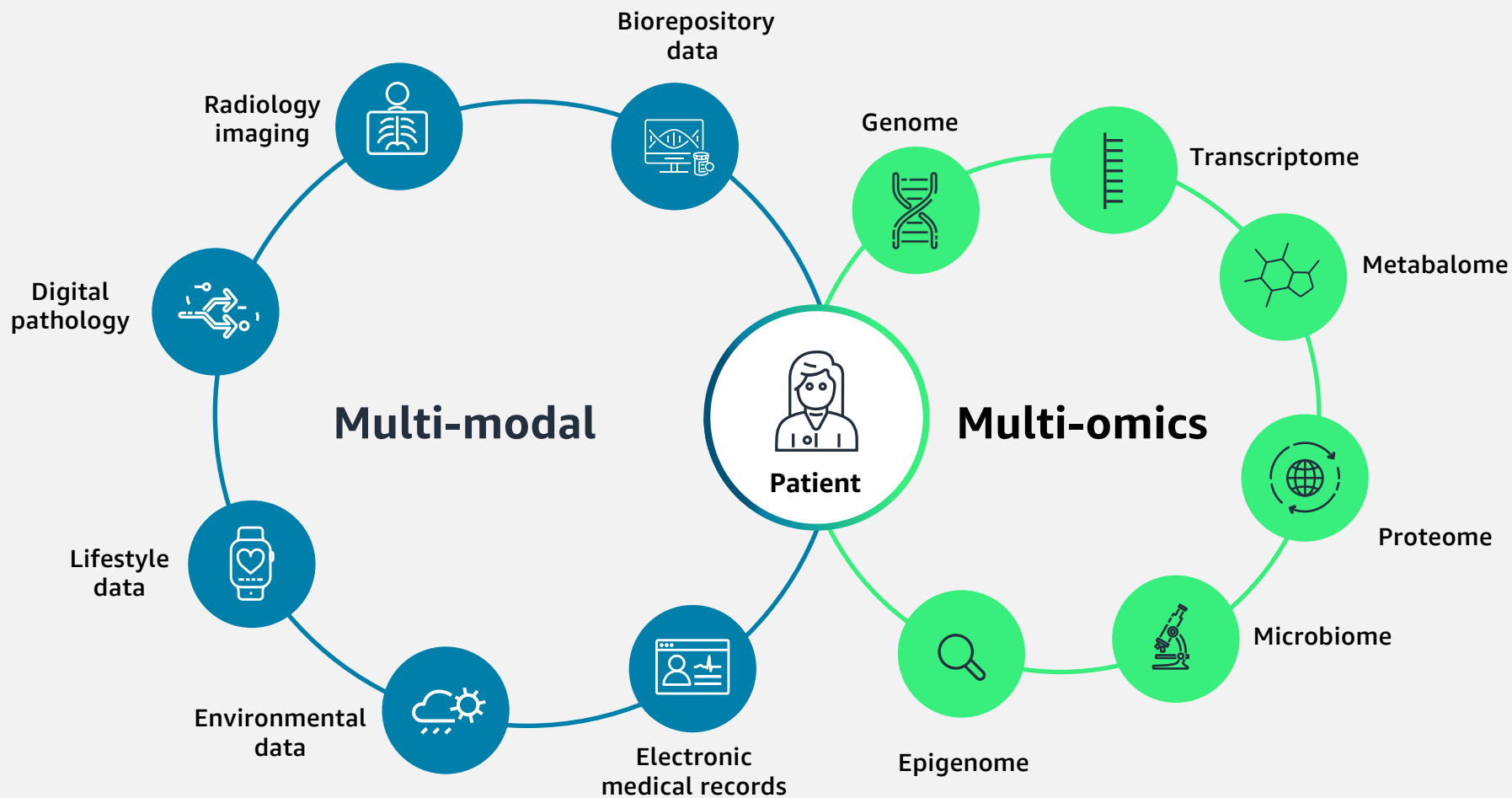
[Read more »](#)



¹ Training Machine Learning Models on Multimodal Health Data with Amazon SageMaker | AWS for Industries

Generating a more holistic view of a patient

From oncology research to drug discovery to the point of care, the unified analysis of various forms of medical and omics data is helping researchers and clinicians generate new insights and offer more personalized care.



In practice: Multi-modal & multi-omics data analysis

Multi-omics

Refers to the practice of integrating and analyzing multiple “omes” such as the genome, proteome, epigenome, transcriptome, or microbiome.



To generate novel insights about cancer biology that its customers and partners could use to develop new treatments, Indivumed applied machine learning to its multi-omics datasets using AWS.

[Read more »](#)

Multi-modal

Refers to the practice of integrating and analyzing differing modalities of medical data, ranging from medical imaging to electronic health records to genomic data.



To support data sharing within the pediatric research community, The Children's Hospital of Philadelphia stored, organized, and released over 1.5 PB of genomic, clinical, and imaging data using AWS.

[Read more »](#)



“Researchers will get the opportunity to study the genetic sequence and images of a tumor in tandem, which will push forward the development of more effective precision therapies and diagnostics

We think of this as an infinity loop—the more we do in genomic healthcare, the more powerful the research assets become, and the more we learn in research, the smarter healthcare delivery becomes.”

Director of Clinical Data and Imaging,
Genomics England

[Read the blog »](#)

Industry challenges

The promise of multi-modal and multi-omics data is becoming evident, but the integration and analysis of varying forms of structured and unstructured data poses a unique set of challenges.



Addressing influx of diverse data types, formats, and access methods



Adhering to FHIR principles



Ingesting, normalizing, structuring, and formatting differing data types for consumption



Creating cohorts and defining relative data subsets

Simplifying Multi-modal & Multi-omics Analysis with AWS for Health

[Read the blog »](#)



Powering multi-omics and multi-modal analysis with AWS for Health

To accelerate the adoption of multi-modal and multi-omics analysis, AWS for Health offers a curated portfolio of purpose-built AWS services and AWS Partner solutions that:



Easily & securely unify data at-scale

Easily integrate and store different forms of medical and scientific data, all within a secure and compliant environment.



Quickly transform unstructured data

Accelerate the transformation of unstructured data, such as medical imaging and unstructured medical text.



Simplify querying & search

Visualize data with the seamless generation of dashboards and leverage powerful machine learning and HPC offerings to rapidly search and query.



Secure, scalable collaboration

Securely share clinical research data with collaborators around the globe and efficiently manage data access at the individual user level with fine-grained access controls, all while aligning to the FHIR open-industry standard.

Simplifying multi-modal & multi-omics with AWS for Health

Whether looking to build a bespoke solution or an out-of-the-box implementation, AWS for Health provides purpose-built services, industry tools, and partner solutions to help unify and analyze varying forms of medical data.



Build

Build end-to-end analysis workloads with [Amazon Omics](#). And integrate additional data modalities with the [Guidance for Multi-omics and Multi-modal Data Integration and Analysis on AWS](#).



Buy

AWS for Health [technology and consulting partners](#) offer out-of-the-box deployments and specialized IT consulting to help you quickly get up and running.

"At Children's Hospital of Philadelphia, we know that getting a comprehensive view of our patients is crucial to delivering the best possible care, based on the most innovative research.

Combining multiple clinical modalities is foundational to achieving this. With Amazon Omics, we can expand our understanding of our patients' health, all the way down to their DNA."

Chief Research Informatics Officer, The Children's Hospital of Philadelphia



Build

AWS purpose-built service: Amazon Omics

Amazon Omics is a purpose-built service designed to help healthcare and life science organizations store, query, and analyze genomic, transcriptomic, and other omics data and then generate insights from that data to improve health and advance scientific discoveries.

Amazon Omics enables large scale analysis and collaborative research across entire population. Healthcare and life science organizations can analyze genomic data with purpose-built data stores, scalable workflows, and multimodal analytics. All with security, privacy, and compliance built-in

[Learn more »](#)



Builder Guidance

AWS guidance for multi-omics and multi-modal data integration and analysis

To help healthcare and life sciences organizations build their own solutions, AWS released the AWS Guidance for Multi-Omics and Multi-Modal Data Integration and Analysis on AWS.

The guidance provides a comprehensive framework detailing how to combine AWS services like Amazon Omics, AWS Glue, and Amazon Athena to integrate different data formats coming from different sources (genomics, clinical, and medical imaging data), extract insights from unstructured medical data, deploy working environments for data and research scientists, and analyze large and complex multi-modal and multi-omics datasets.

[Learn more »](#)



AWS for Health Featured Consulting Partner: BioTeam

BioTeam, a scientific IT consulting company expert in applying strategies, advanced technologies, and IT services, can help implement and customize this guidance to ingest customized datasets.



Buy

Featured AWS for Health Partners

AWS for Health provides a curated portfolio of AWS Partner solutions for the handling and analysis of multi-modal and multi-omics data, including:

DNAexus®

DNAexus offers a secure, scalable, and purpose-built cloud platform built on AWS that leverages multi-modal and multi-omic data to drive precision medicine insights.

[Learn more](#)

illumina

Illumina Connected Analytics (ICA), a production bioinformatics platform deployed on AWS, delivers a comprehensive suite of data analysis and management tools. Integrating Illumina Correlation Engine with ICA streamlines searching public data sets for similar signatures in other biological samples enabling phenotypic exploration for multi-omic insights.

[Learn more](#)

PHILIPS

Philips HealthSuite Platform, built on AWS, makes it simpler for oncology teams to deliver personalized therapy to patients by integrating genomic data with other modalities like imaging, digital pathology, and clinical data.

[Learn more](#)



The Lifebit Platform, powered by AWS, is an end-to-end solution enabling organizations to harness the power of large-scale clinical-genomic data to drive research and clinical insights.

[Learn more](#)

Customer highlight: Roche



Challenge

In its journey to improve the development of and access to new personalized treatments, Roche sought to unify varying data modalities to generate a more holistic view of an individual. However, its existing data workflows were unable to unify and analyze varying data modalities requiring a new approach.



Solution

Using AWS, Roche developed Apollo, which enables Roche to streamline and scale multi-modal data analysis, uniting real-world, clinical trial, imaging, pathology, radiology, electronic health records (EHR), wearables, and genomic data.



Results

- Reduced time to analyze image files from three days down to hours
- Reduced time to process EHR data from two days down to minutes
- Cost-effectively scaled to store data from over 200,000 patients and house more than 50 million images
- Support 1,300 scientist across 40 Roche sites globally



"By using AWS to connect the multi-modal data sets that still exist in most clinical settings and provide collaboration tools and intuitive workflow products for researchers to analyze these datasets in tandem, Roche is taking steps closer towards their mission to provide every patient with the best treatment possible in the fastest time possible."

Head of Personalized Healthcare, Pharma Informatics,
Roche

[Read more »](#)

Get started with AWS for Health

The next-generation of data-driven patient care is here.

Learn more about how AWS for Health can help you
unlock greater insights from your data.

[Contact Us »](#)





Resources

- **Technical blog: Building Scalable Machine Learning Pipelines for Multimodal Health Data on AWS** [»](#)
- **Technical blog: Training Machine Learning Models on Multimodal Health Data with Amazon SageMaker** [»](#)
- **AWS guidance: Multi-omics and Multi-modal Data** [»](#)
- **FHIR Works on AWS: Implementation Guide** [»](#)
- **Amazon Omics Blog: Introducing Amazon Omics** [»](#)
- **Webinar: Multi-omics and Multi-modal Data Integration & Analysis** [»](#)