

Operationalizing Health AI for Clinical Research & Care

Naqi Khan, MD, MS, FAMIA
CMIO, Health Data & AI
Global Healthcare Industry Solutions
Amazon Web Services



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The Healthcare AI Landscape: Navigating Pressures, Embracing Potential



Current Realities

Clinician & researcher burnout

Operational demands

Economic pressures



Data Explosion

EHRs

Imaging

Genomics

Pathology



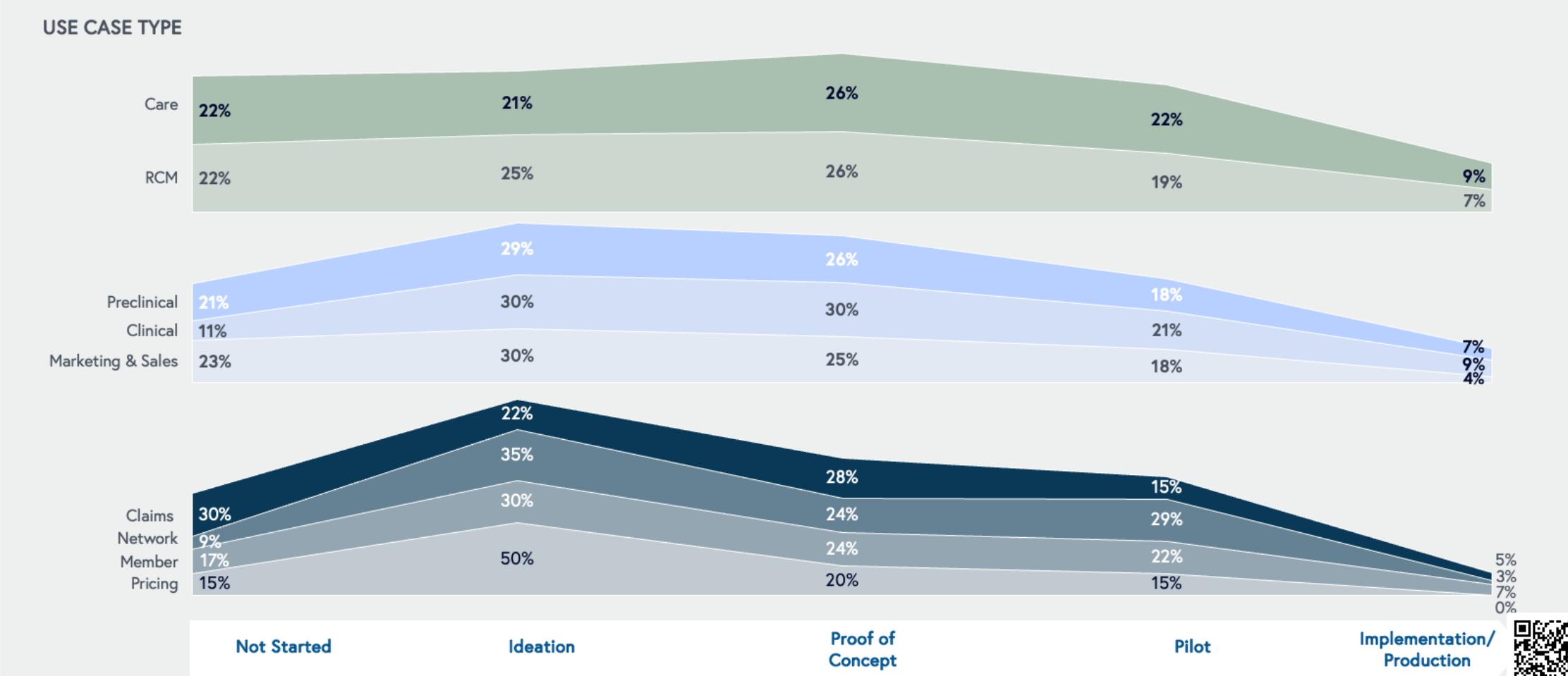
The Opportunity

Transform siloed data

Simplify research & care delivery

Accelerate & improve decision -making

AI Use Case Implementation



How Customers Are Using AWS for Healthcare

A SAMPLING OF CUSTOMER - LED HEALTH AI INITIATIVES WITH AWS



Medical Research

Patient-to-trial matching

Multi-modal data analysis

Research summarization



Clinical Tasks

Patient record summarization

Ambient clinical documentation

Automated medical image interpretation



Operational Efficiency

Auto-generated referral letters

Automated prior authorization

Enhanced RCM and clinical coding



Patient Experience

Patient outcome prediction

Personalized patient discharge instructions

Customized treatment plans



Digital Health

Patient care concierge

24/7 bot-mediated triage

Virtual health coaches



Real World Health AI Interlude 1:

NHS England



Foresight: AI for Predictive Healthcare



NHS England, UCL, and KCL teamed up to build **Foresight AI**, using anonymous health data from **57M people to predict health outcomes** and improve care across the UK.

Scans over **10B health records to catch diseases early**, helping doctors plan better and focus on everyone, including underrepresented groups.

Aims to **prevent illness rather than just treat it**, offering personalized care and making healthcare fairer for all.

“ Foresight shows the incredible potential of AI combined with secure access to the deidentified data held in NHS England's SDE. This project is paving the way for smarter, more predictive healthcare – helping us improve patient outcomes across the UK.

Michael Chapman, Director of Data Access and Partnerships, NHS England



[https:// digital.nhs.uk /data -and-information/research -powered-by-data/case-studies/foresight -ai](https://digital.nhs.uk/data-and-information/research-powered-by-data/case-studies/foresight-ai)

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Real World Health AI Interlude 2:

Thailand's Chulalongkorn University



Rapidly Scaling Mental Health Support



AIMET at Chulalongkorn University screened **400,000+ users, identifying 7,000 high-risk individuals** for intervention

AI voice bot processed **100,000 calls within six months, achieving 40% user adoption** rate

Reduced critical case response times from **30 minutes to 7 minutes** using intelligent triage

Maintained **99.9% availability** during peak demand

*"AWS has completely changed how we deliver mental health support. **Being able to scale during critical times, like late night hours when demand is highest, has been essential for our mission** to make mental healthcare more accessible to everyone."*

Assistant Prof. Natawut Nupairoj, PhD
Department of Computer Engineering, AIMET

<https://aws.amazon.com/solutions/case-studies/aimet-case-study/>



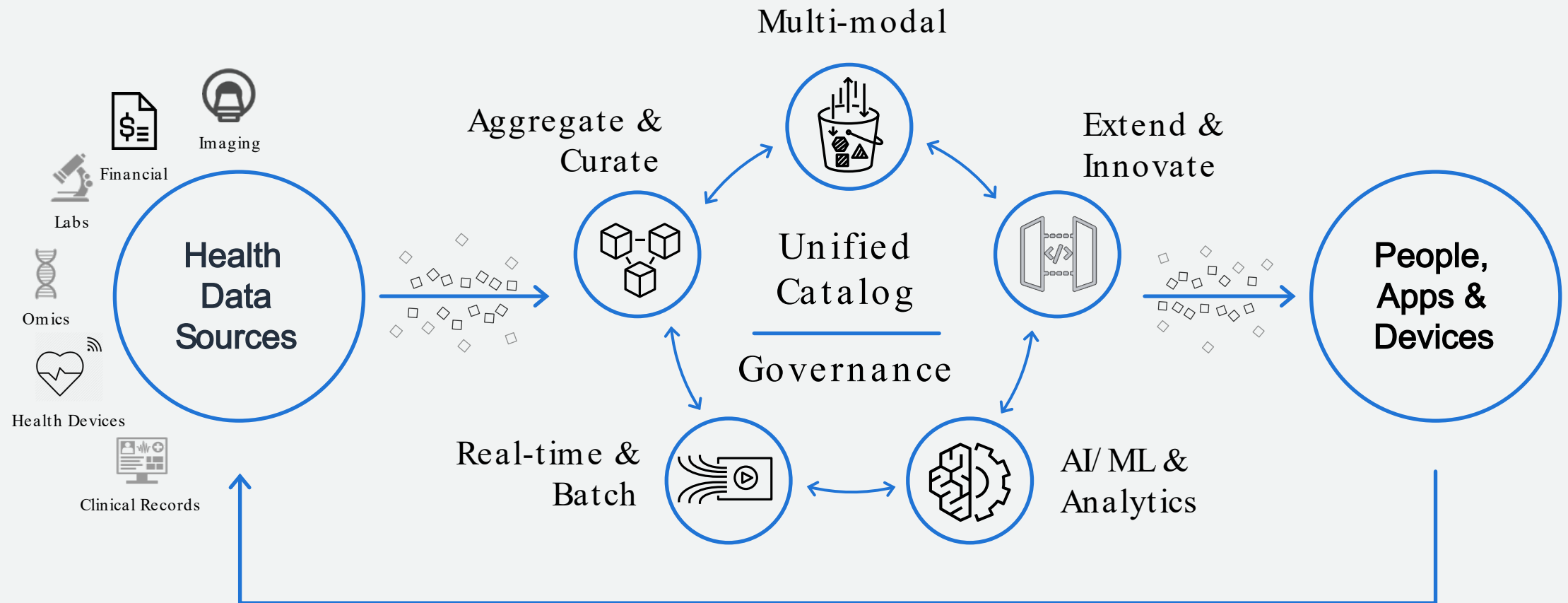
How Do We Do This Right?



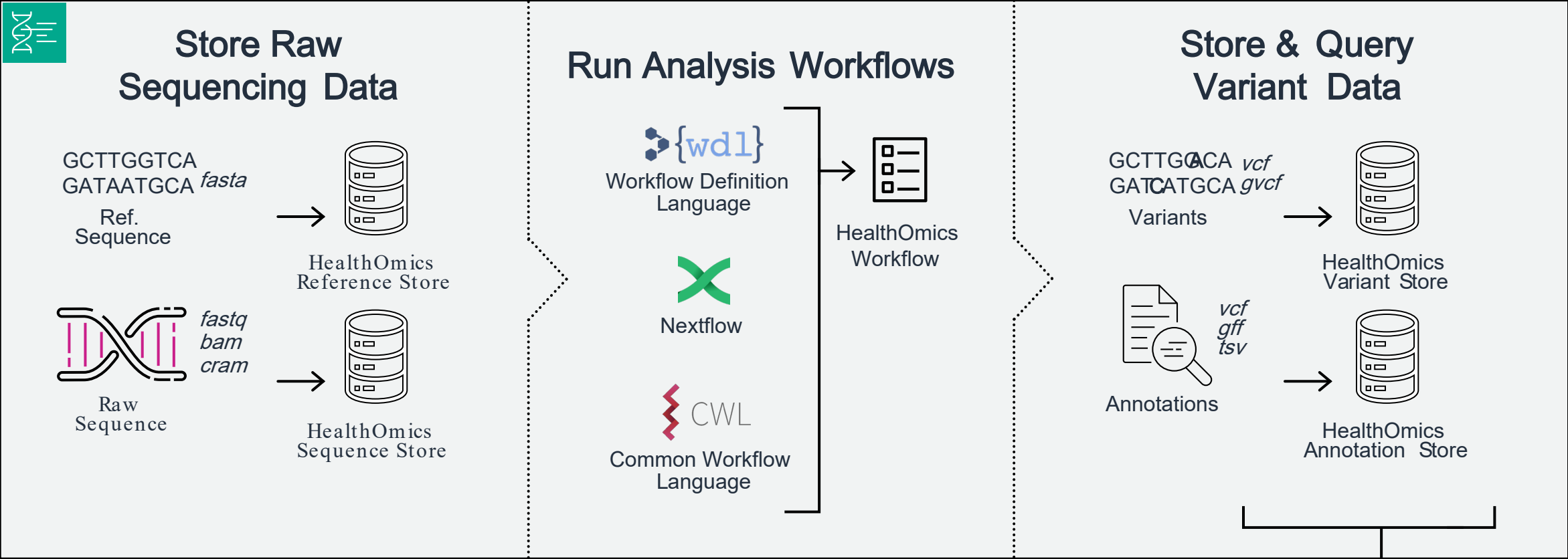
AWS Health for Data & AI

**Suite of services, solutions, prescriptive guidance,
and data reference architectures
purpose-built for healthcare and life sciences**

Modern Health Data Architecture



Leveraging AWS HealthOmics



[https:// aws.amazon.com/ healthomics /](https://aws.amazon.com/healthomics/)



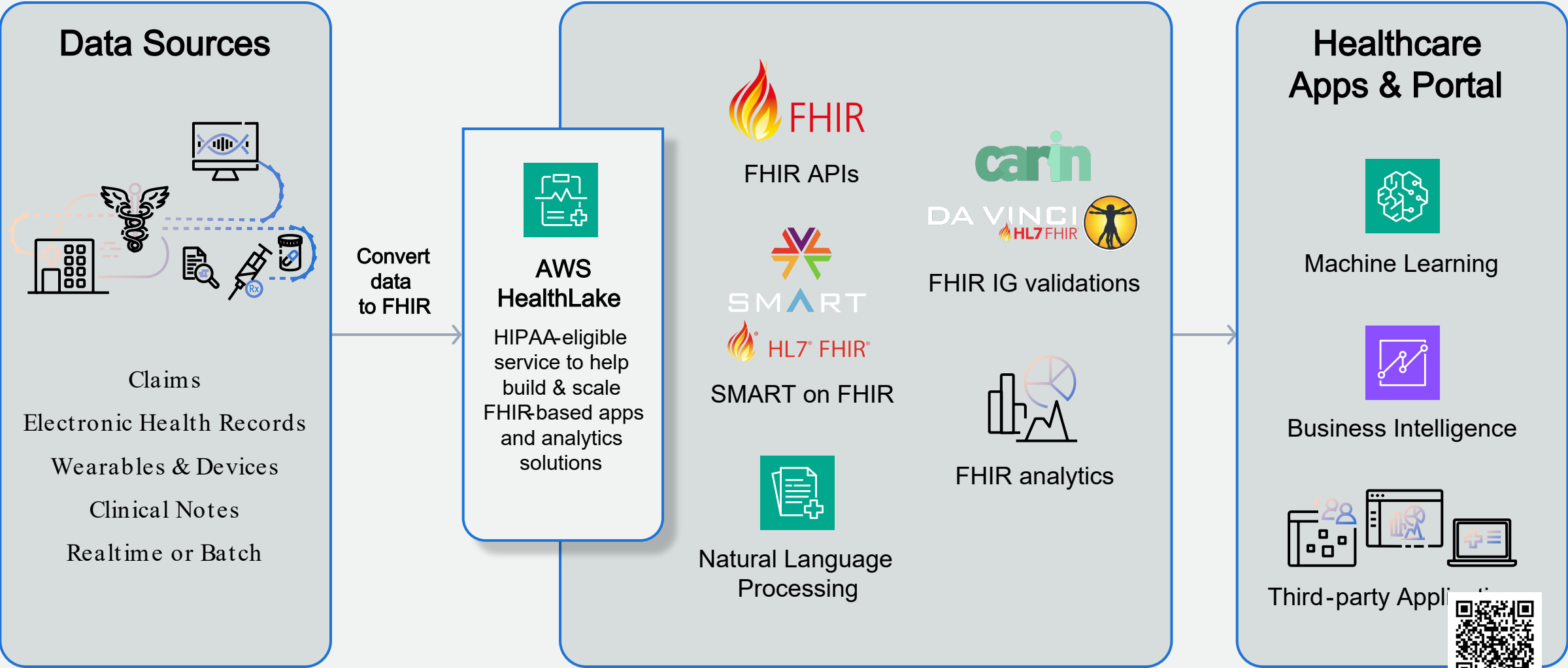
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Query & Interpret



Accelerating FHIR Adoption with AWS HealthLake



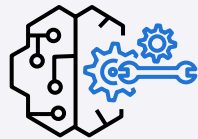
Amazon Bedrock

THE MOST FLEXIBLE, COMPREHENSIVE WAY TO BUILD AND SCALE GENERATIVE AI APPLICATIONS

VE AI APPLICATIONS



Choose the best
model



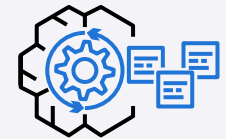
Optimize for
cost, latency, &
accuracy



Securely
customize with
your data



Apply safety &
responsible AI
checks



Build &
orchestrate
Agents

[https:// aws.amazon.com/bedrock/](https://aws.amazon.com/bedrock/)



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Open Source Healthcare Agent Toolkit on AWS

BEST PRACTICES FOR BUILDING HEALTHCARE & LIFE SCIENCE
WORKFLOWS WITH AMAZON BEDROCK AGENTS





Healthcare and Life Sciences Agent Catalog

All Supervisors Individual

Supervisors

☐

clinical-trial-protocol-assistant
Clinical Trial Protocol Assistant for developing comprehensive clinical trial protocols
No tags available

☐

Competitive-Intelligence-Agent
Analyze business, financial, and patent information using search
No tags available

Individual Agents

☐

clinical-study-research-agent
Agent that helps users explore, filter, and analyze clinical trial data
No tags available

☐

SEC-10-K-Search-Agent
Perform financial analysis of a given company using their SEC 10-K filings in the EDGAR database
No tags available

☐

clinical-trial-protocol-generator-agent
Agent that helps users create, review, and optimize clinical trial protocols based on best practices and common data models
No tags available

☐

Tavily-Web-Search-Agent
Answer questions by searching the internet.
No tags available



Welcome to Life Science Agents

All Supervisors Individual

Individual Agents

☐

agent-quick-start
You are a helpful AI assistant skilled at speaking in both english and spanish.
No tags available

☐

biomarker-database-analyst
Agent for querying biomarkers database.
[agent_tags: Life Science/Healthcare](#)



Life Science Agents Catalog

☐

biological-pathways-agent
Biological pathways analysis with Reactome data
No tags available

☐

Clinical-evidence-researcher
Research internal evidence from knowledge bases and external evidence from PubMed.
No tags available

Real World Health AI Interlude 3:

Genomics England



Extracting Oncology Features from Path Reports

Automated analysis of **70k pathology reports across 15k cancer cases** using Amazon Bedrock

Demonstrated **high precision and recall across tumor characteristics**

Expanded research capabilities by unlocking previously inaccessible pathology insights for genomic analysis

HISTOLOGIC TYPE: Urothelial (transitional cell) carcinoma. **CANCER TYPE**

ASSOCIATED EPITHELIAL LESIONS: None identified. HISTOLOGIC GRADE: Urothelial carcinoma - **High-grade. GRADE WHO 1973** TUMOR CONFIGURATION: Papillary, Solid/nodule, Flat. PATHOLOGIC STAGING (pTNM): **pT3a T STAGE** **pNO N STAGE**

Overall Metric Heatmap

	Recall	Precision
Cancer type	0.98	1
Grade WHO 1973	0.95	0.95
CIS presence	0.87	0.88
T stage	0.95	0.96
N stage	1	1
Cancer subtype	0.91	0.95
Grade WHO/ISUP 2004	0.94	0.95

<https://www.genomicsengland.co.uk/blog/extracting-bladder-tumour-characteristics-from-pathology-reports-using-large-language-models>



Real World Health AI Interlude 4:

Froedtert & Medical College of Wisconsin

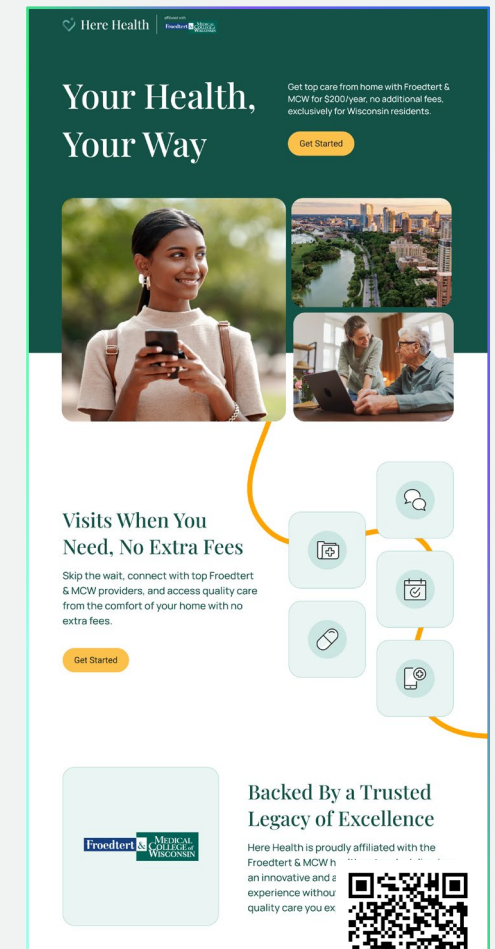
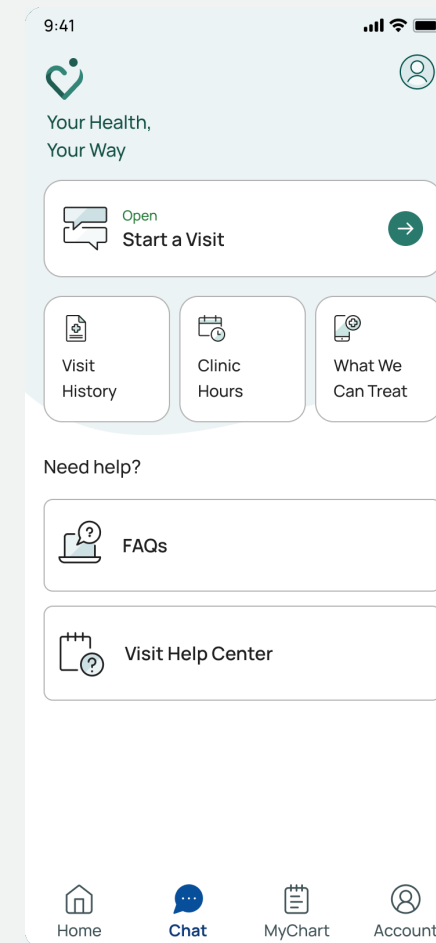
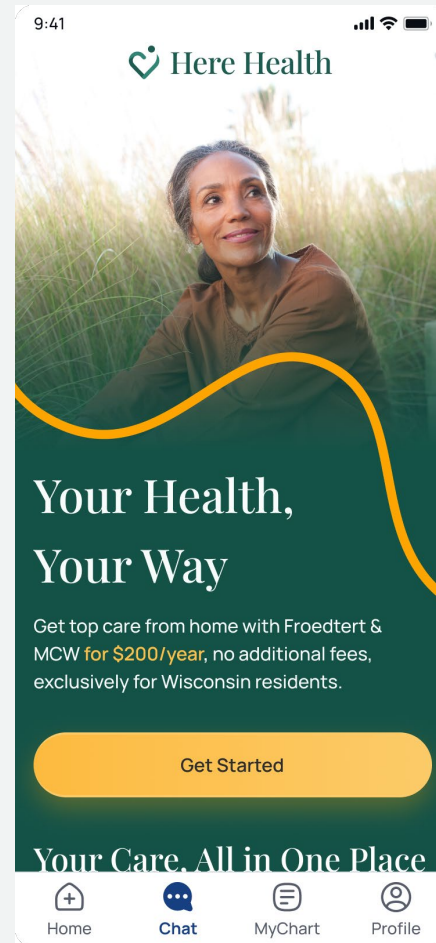


Reimagining the Patient Experience

Intelligent Health
Monitoring of **health records, device data, and patient -reported outcomes**

The system **identifies high -risk patients** and care gaps for proactive interventions

Mobile app with access to health data and **personalized recommendations**



Looking Ahead



The Future is Bright

NEJM
Catalyst

COMMENTARY

Ambient Artificial Intelligence Scribes: Learnings after 1 Year and over 2.5 Million Uses

Authors: Aaron A. Tierney, PhD , Gregg Gayre, MD, Brian Hoberman, MD, MBA, Britt Mattern, Manuel Ballesca, MD, Sarah B. Wilson Hannay, MD, MEd, Kate Castilla, Cindy S. Lau, MD, Patricia Kipnis, PhD, Vincent Liu, MD, MS, and Kristine Lee, MD [Author Info & Affiliations](#)

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Overall, 84% of physicians felt that using AI scribes had a positive impact on their visit interactions.”



ORIGINAL ARTICLE

Randomized Trial of a Generative AI Chatbot for Mental Health Treatment

Authors: Michael V. Heinz, M.D. , Daniel M. Mackin, Ph.D. , Brianna M. Trudeau, B.A. , Sukanya Bhattacharya, B.A. , Yinzhou Wang, M.S. , Haley A. Banta , Abi D. Jewett, B.A. , Abigail J. Salzhauer, B.A. , Tess Z. Griffin, Ph.D. , and Nicholas C. Jacobson, Ph.D.  [Author Info & Affiliations](#)

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arXiv > cs > arXiv:2412.10849

Computer Science > Artificial Intelligence

[Submitted on 14 Dec 2024]

Superhuman performance of a large language model on the reasoning tasks of a physician

Peter G. Brodeur, Thomas A. Buckley, Zahir Kanjee, Ethan Goh, Evelyn Bin Ling, Priyank Jain, Stephanie Cabral, Raja-Elie Abdunour, Adrian Haimovich, Jason A. Freed, Andrew Olson, Daniel J. Morgan, Jason Hom, Robert Gallo, Eric Horvitz, Jonathan Chen, Arjun K. Manrai, Adam Rodman



An Opportunity to Accelerate “Scalable Privilege”

August 24, 2023

Artificial Intelligence—From Starting Pilots to Scalable Privilege

Atul J. Butte, MD, PhD^{1,2}

» [Author Affiliations](#)

JAMA Oncol. Published online August 24, 2023. doi:10.1001/jamaoncol.2023.2867

There is no doubt that AI and LLMs are not yet perfect, and they carry biases that will need to be addressed.⁸ These algorithms will need to be carefully monitored as they are brought into health systems.⁹ But this does not alter the potential of how they can improve care for both the haves and have-nots of health care. It is time to stop thinking of AI as “nice to have” pilot projects and start realizing that we need AI as a “scalable privilege” for all patients.



Thank You!

Naqi Khan, MD, MS, FAMIA
naqikhan@amazon.com

