

# Trends and Innovations in Healthcare IT

Jeff Fried  
Director of Platform Strategy





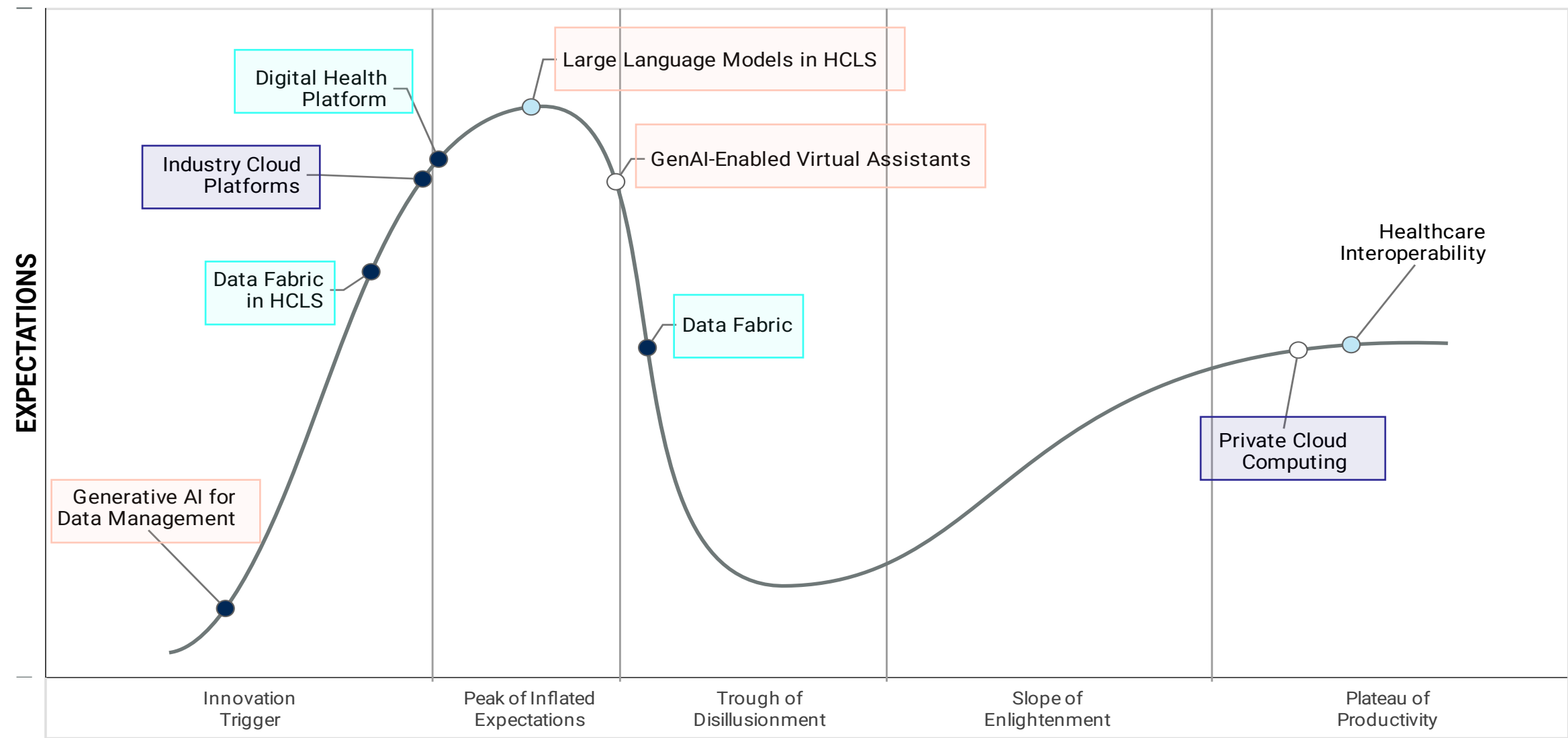
## Outline: Selected Trends



- Digital Health Platforms & Data Fabric in Health Care
- Cloud Adoption & Healthcare Clouds
- Generative AI in Healthcare



# Hype Cycle (Gartner)



Plateau will be reached: ○ <2 yrs. ● 2-5 yrs. ● 5-10 yrs. ● >10 yrs. ✗ Obsolete before plateau







**“By 2024, data fabric deployments will quadruple efficiency in data use, while cutting human-driven data management tasks in half” \*\***

GARTNER®



























\*\*Gartner Insights, Striving to Become a Data-Driven Organisation? Start With 5 Key D&A Initiatives, <https://www.gartner.co.uk/en/information-technology/insights/data-and-analytics-essential-guides>

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# Data Fabric Is an Integrated Layer of Connected Data



| RDBMS/OLTP   | Traditional Analytics/BI  | Data Lakes   | Cloud Data Stores   | Apps and Document Repositories   |
|--|---|--|---|--|
| <div><br/>Flat Files</div> <div><br/>Third Party</div> <div><br/>Legacy</div> | <div><br/>Data Warehouse</div> <div><div><br/>ETL</div><div><br/>Mart</div></div> <div><div><br/>ETL</div><div><br/>Mart</div></div> | <div></div> <div></div> <div></div> | <div></div> <div></div> <div></div> | <div><div><br/>XML</div><div><br/>JSON</div></div> <div><div><br/>PDF</div><div><br/>DOC</div></div> <div><div><br/>WEB</div></div> |

Source: Gartner  
767157\_C



# Why Adopt Data Fabrics?

|                             | Drivers   |
|-----------------------------|---|
| Business Perspective        | <ul style="list-style-type: none"><li>• Enable <b>less technical users</b> to quickly find, access, integrate and share data</li><li>• Allows <b>subject matter experts in the business</b> to become a part of the data modeling process</li><li>• <b>Reduce the cycle time</b> of accessing ready-to-use data</li></ul>   |
| Data Management Perspective | <ul style="list-style-type: none"><li>• <b>Productivity</b> advantages of automated data transformation and integration – gives time back to IT resources</li><li>• <b>Cost optimization</b> benefits of not having to buy multiple tools with redundant/overlapping capabilities</li><li>• Automated <b>optimization</b> of data <b>integration resulting in better price/performance and ROCE</b></li></ul> |
| Organizational Perspective  | <ul style="list-style-type: none"><li>• Improved <b>communication</b> between data managers and data consumers creates a collaborative culture and a more agile, more resilient, more competitive organization</li></ul>  |



[Read Case Study](#)

# Real time smart data fabric supporting dozens of applications and hundreds of clients

## Challenge

- Required an **enterprise data fabric** that consolidates and normalizes data across business lines and asset classes; provides ability to perform complex calculations and analytics
- To develop **new service offerings**

## Outcome

A dynamic, enterprise-wide smart data fabric:

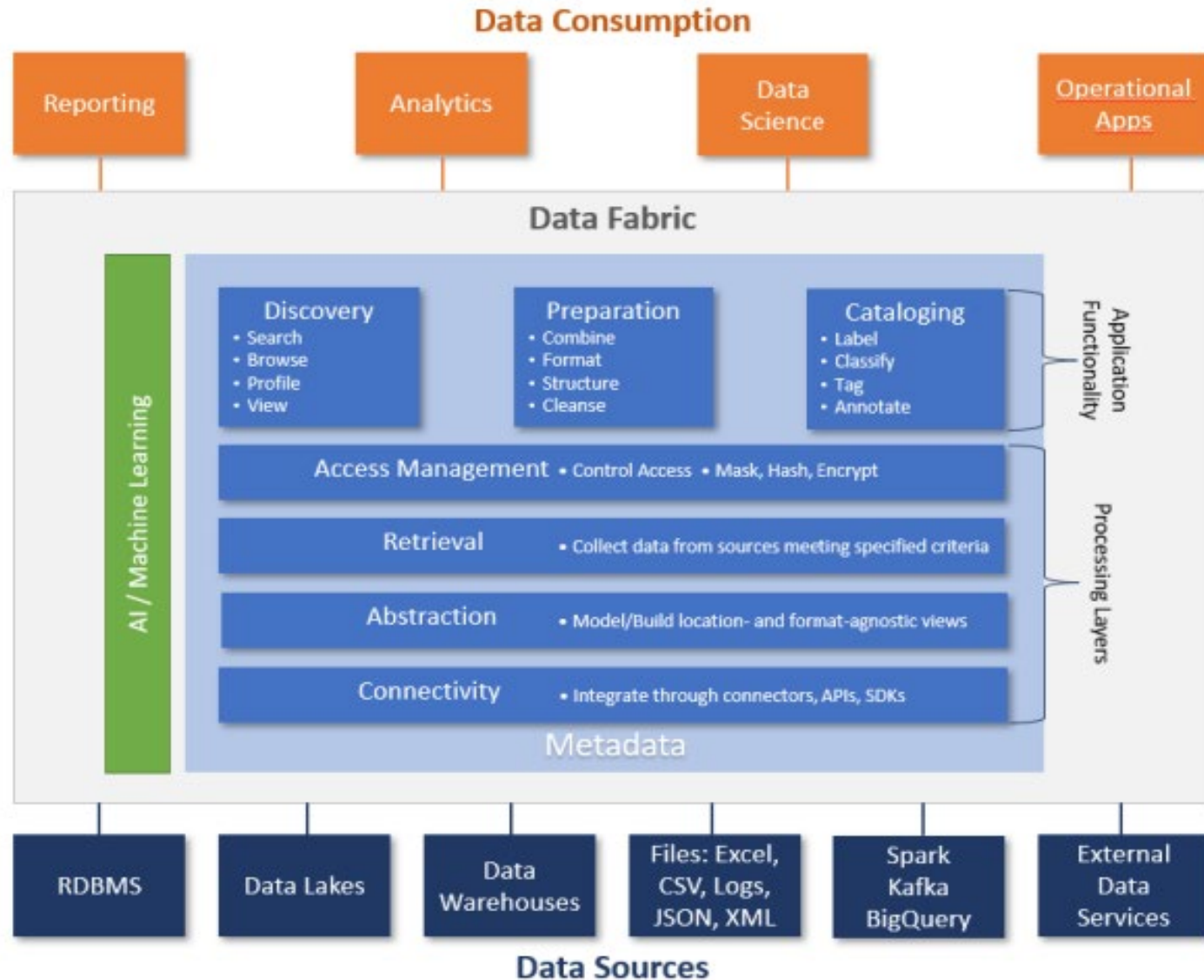
- **Integrates data** from various sources and with internal and client applications with sub-second SLAs for near-real time updates to their suite of applications
- Calculates real time positions and “on the fly” aggregations for postings and balance data; performs various middle and back office processing functions, including trade reconciliations, enrichment and bookkeeping
- **Replaced multiple data management software products** (*AWS Aurora, AWS Redshift, AWS DynamoDB, RedisLabs, AWS Elasticsearch*)
- Gaining **9X performance improvement on 30% of the infrastructure**

Next gen wealth management platform:

- Microservices based aaS application on AWS leveraging the data fabric
- <1s response time; able to scale 5X on demand; supports 16K concurrent users; reduced RTO from 15 minutes to 4 seconds



# A data fabric includes many components

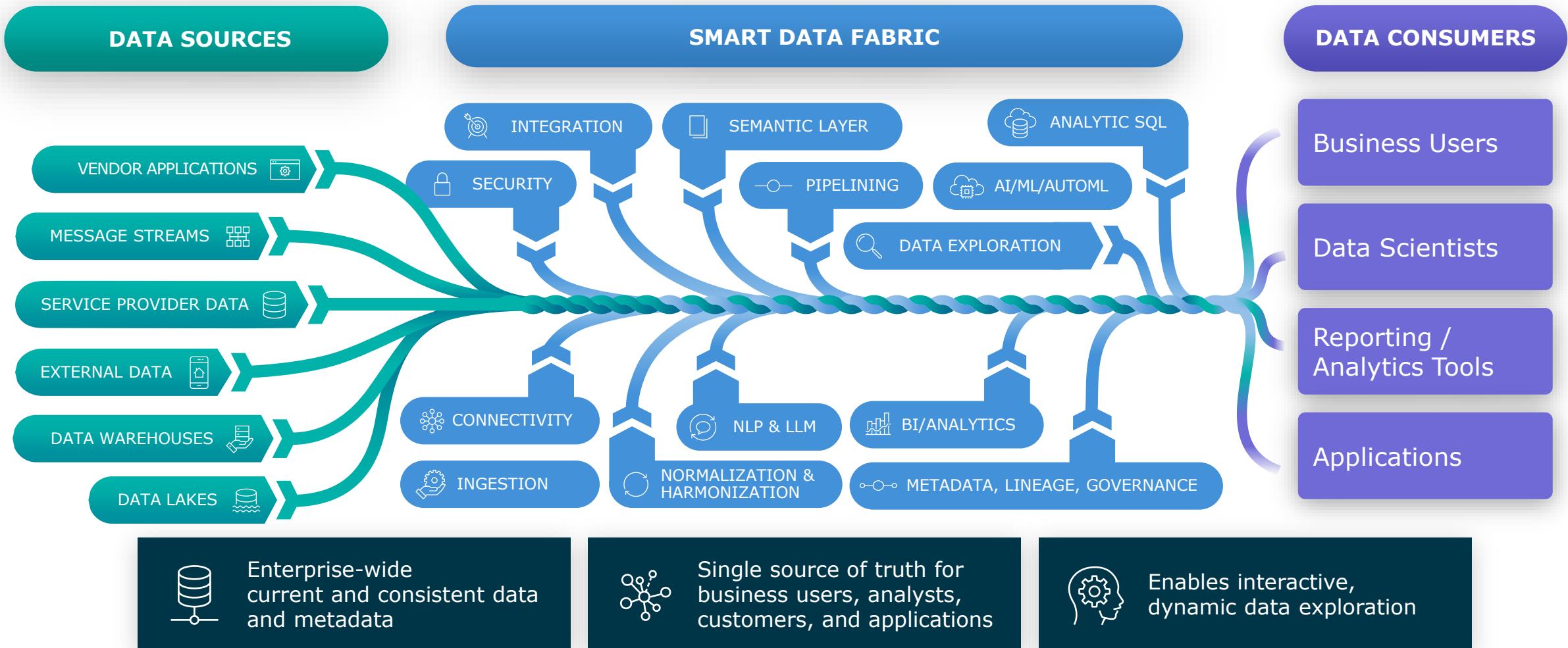


## Data Fabric: The Next Step in the Evolution of Data Architectures

ECKERSON GROUP Report  
January 2023



# Smart Data Fabric







## Largest US public health information exchange (HIE) supporting 20m+ patients

### Challenge

- Integrate and process **disconnected healthcare data** to provide transparency and alerting to support 20 million+ patients, providers, insurers, pharmacies, etc.
- **Create new revenue** generating data products

### Outcome

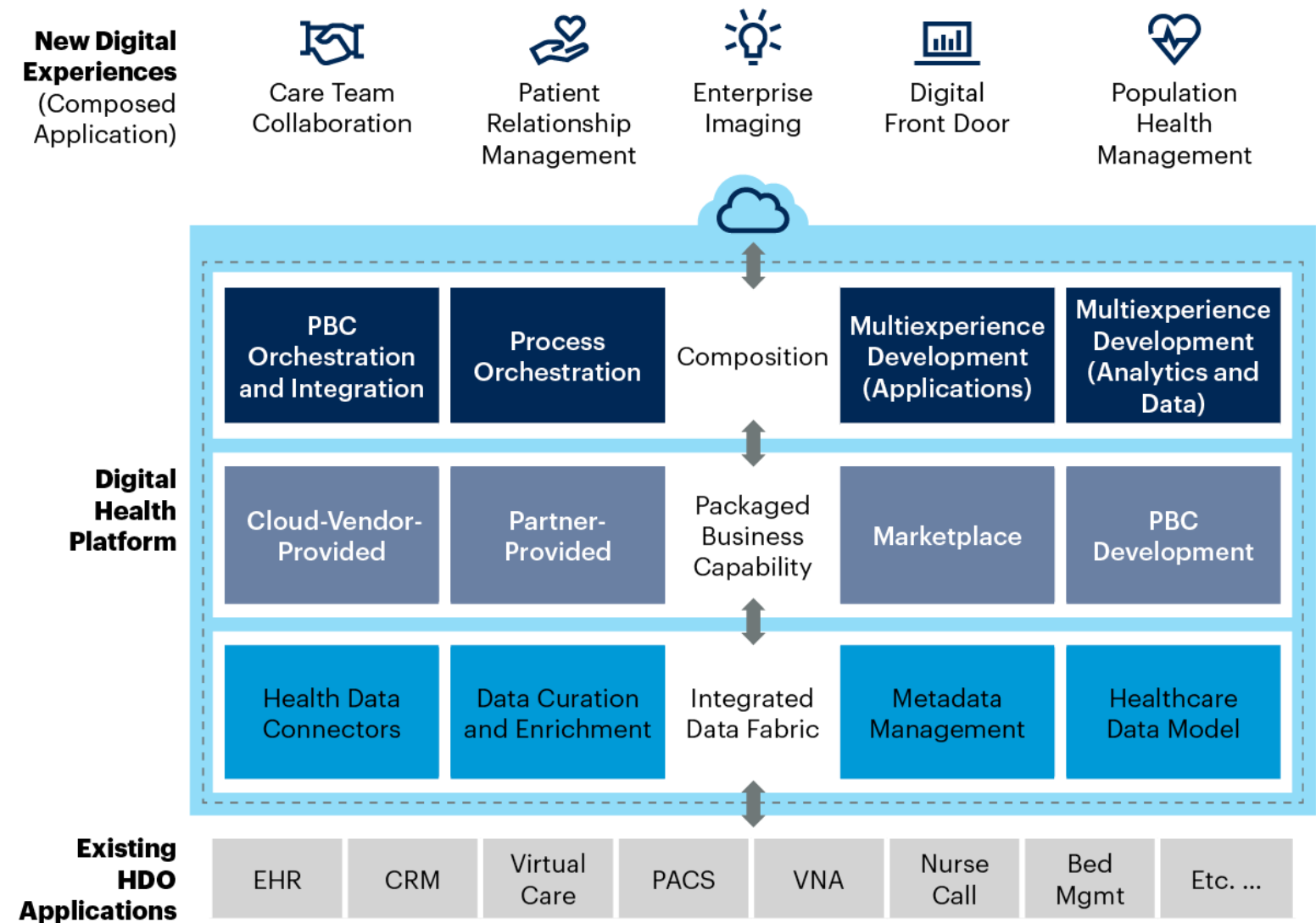
- Successfully integrating **300 million data elements** from 18,000 healthcare providers spanning 8,000 healthcare facilities
- Providing secure, permissioned, **unified view of patients' data** to patients, providers, payers, pharmacies, labs, etc.
- Detecting real time events and **sending 9 million real time alerts a month** to notify providers and payers about patient's whereabouts and status in the healthcare continuum
- Running aggregates and analytics, e.g. **population health** (spread of COVID, flu season projections, etc.)
- Creating and **monetizing data products** for pharmacies, pharmaceutical companies, etc.



Read Case  
Study



# The DHP Reference Architecture



Healthcare provider CIOs are increasingly focused on capabilities for care delivery that enable innovation in patient engagement, data and analytics (D&A) and virtual care to meet clinical and business transformation needs.

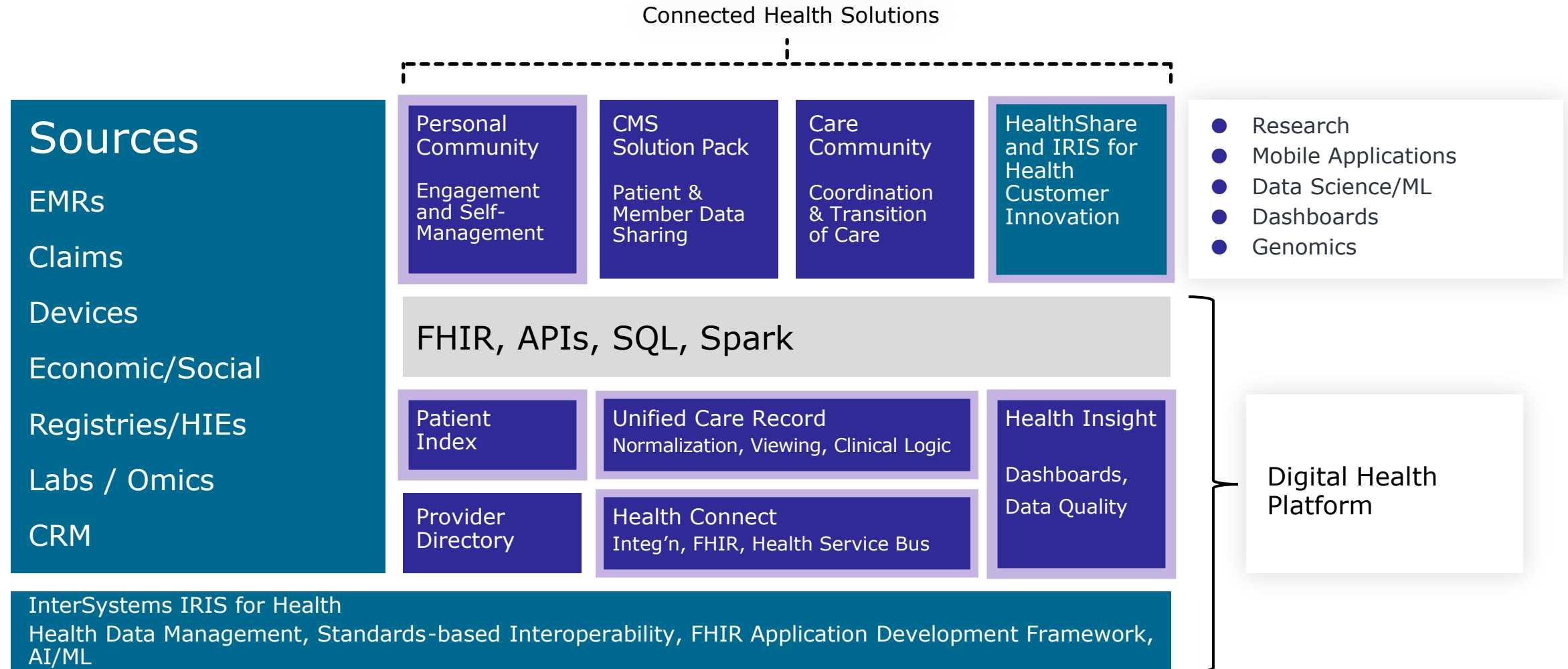
Mike Jones, Gartner, December 2022

Source: Gartner  
PBC = packaged business capability  
752852\_C



# The InterSystems HealthShare Solution Set

## Building and delivering innovative solutions upon trusted data





# InterSystems Digital Health Platform



- Data Fabric ~ InterSystems IRIS for Health
- Prebuilt Business Components ~ HealthShare

## 5 Things You Need to Know About InterSystems' Digital Health Platform

3 October 2023 - ID G00791270 - 2 min read

By [Andrew Meyer](#), [ck Andrade](#)

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Initiatives: [Industry Product Planning and Strategy](#)

InterSystems' digital health platform has a broad and expanding set of capabilities and partnerships. This downloadable presentation provides product leaders with important information on five key areas when considering product and go-to-market strategy.





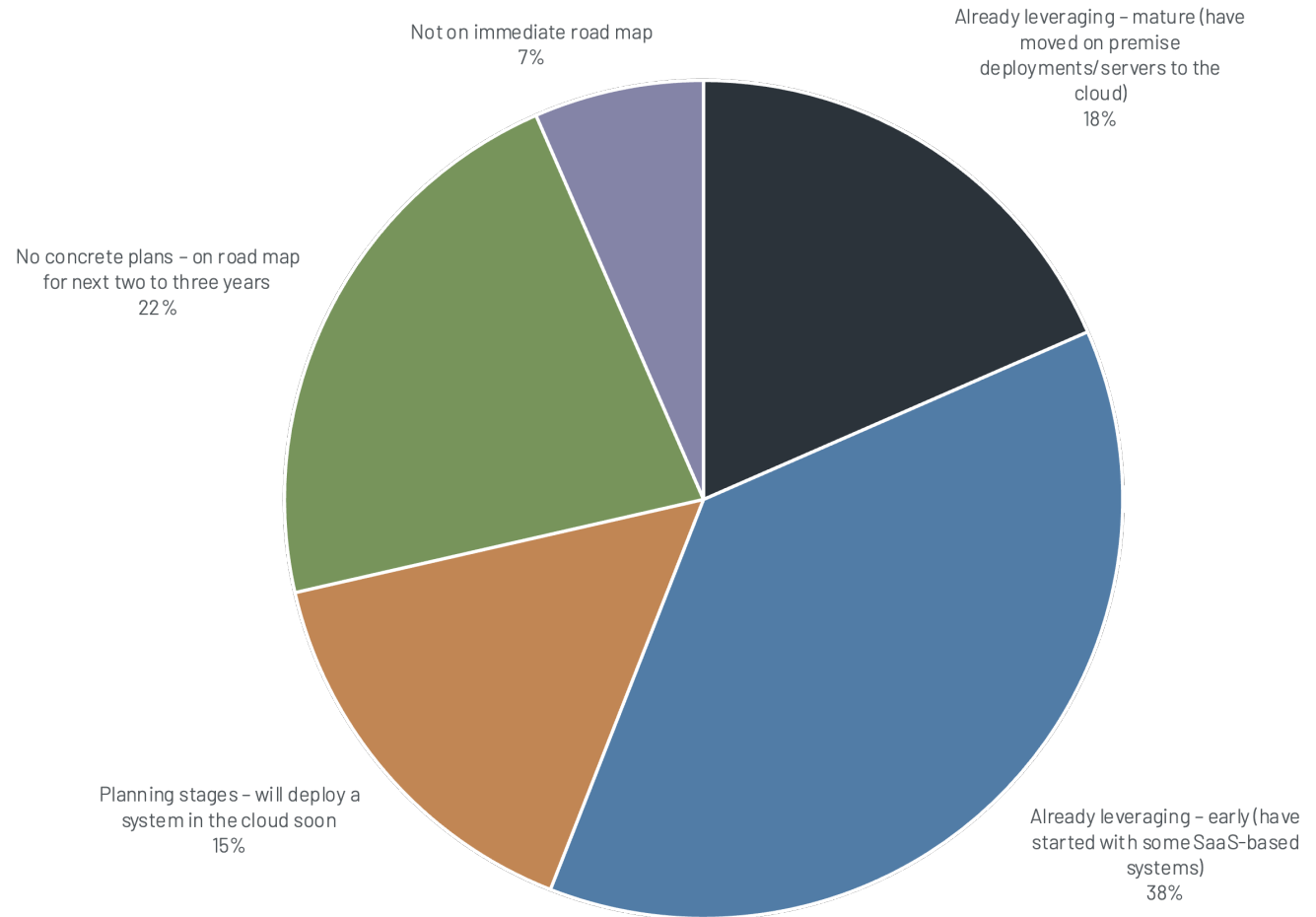


# Worldwide, more than half of healthcare providers are using the cloud



## Cloud Status—All Regions Combined

n=168

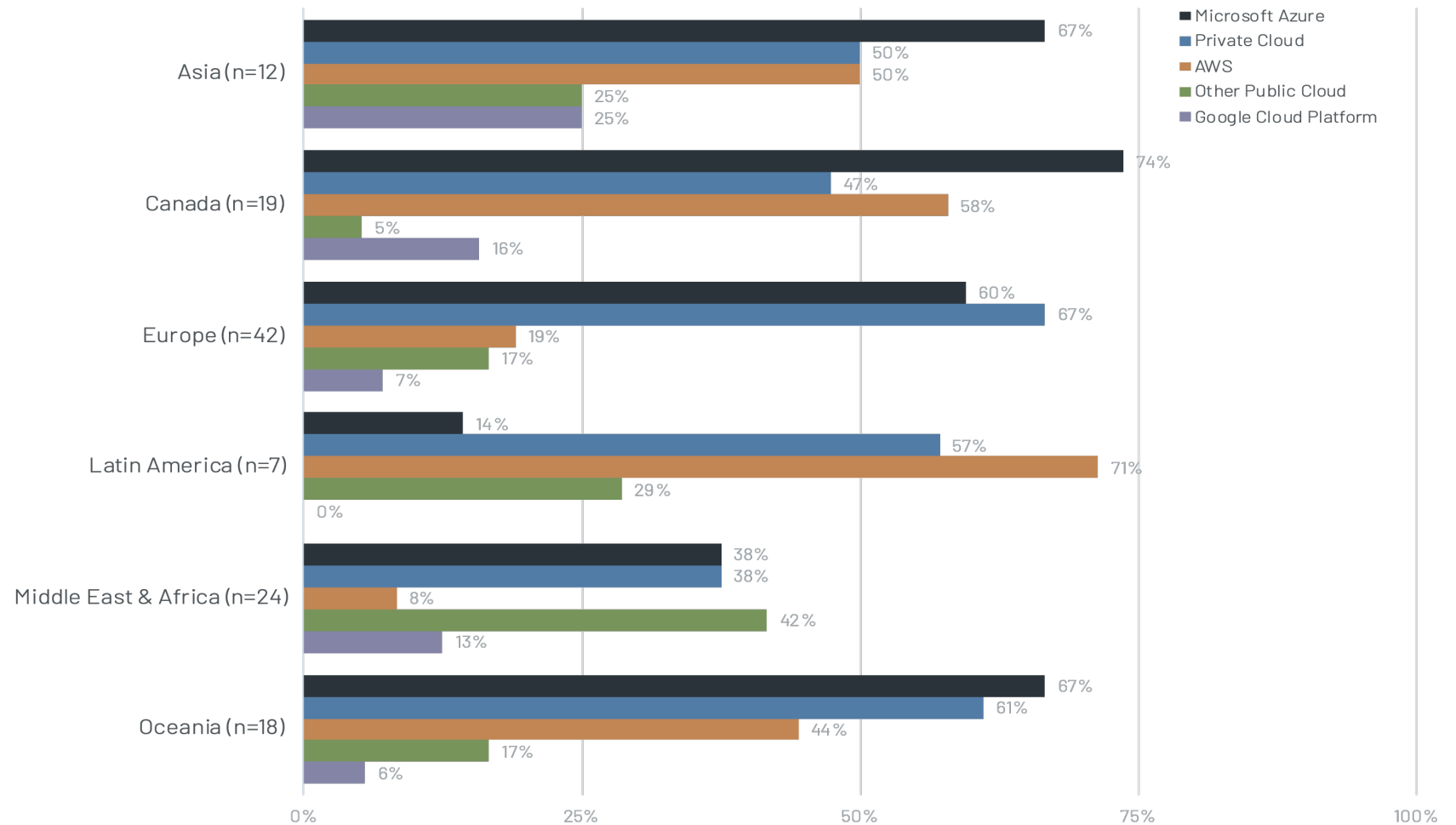




# Outside of the US, Cloud adoption by Healthcare providers includes significant use of private cloud



**Cloud Platform Consideration/Usage by Region**





# Benefits and Obstacles of Cloud adoption by Healthcare Providers

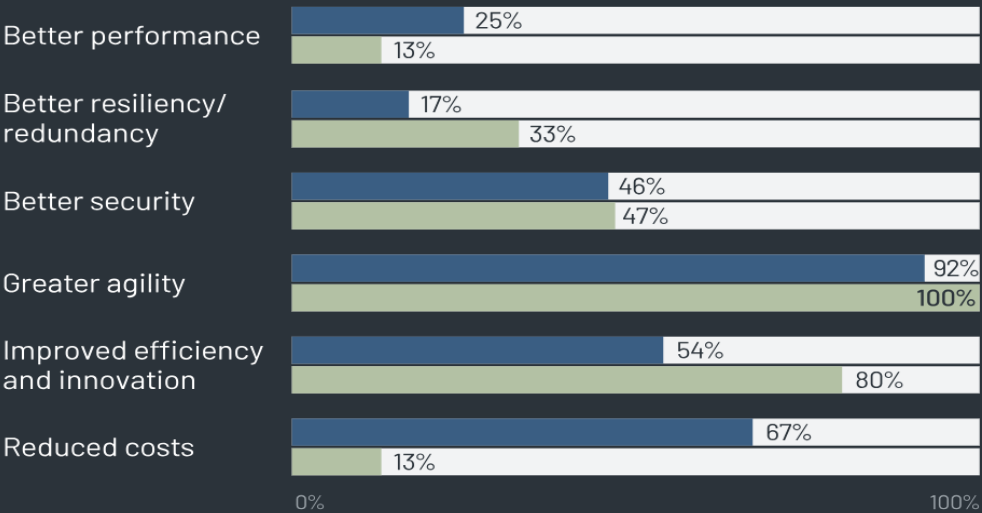


Across cloud providers, the most-reported benefit is improved agility, which involves fast scalability, automated provisioning, and automated procurement.

## Improved Agility Is the Biggest Benefit of the Cloud

### What Benefits Does Your Primary Cloud Provider Deliver?

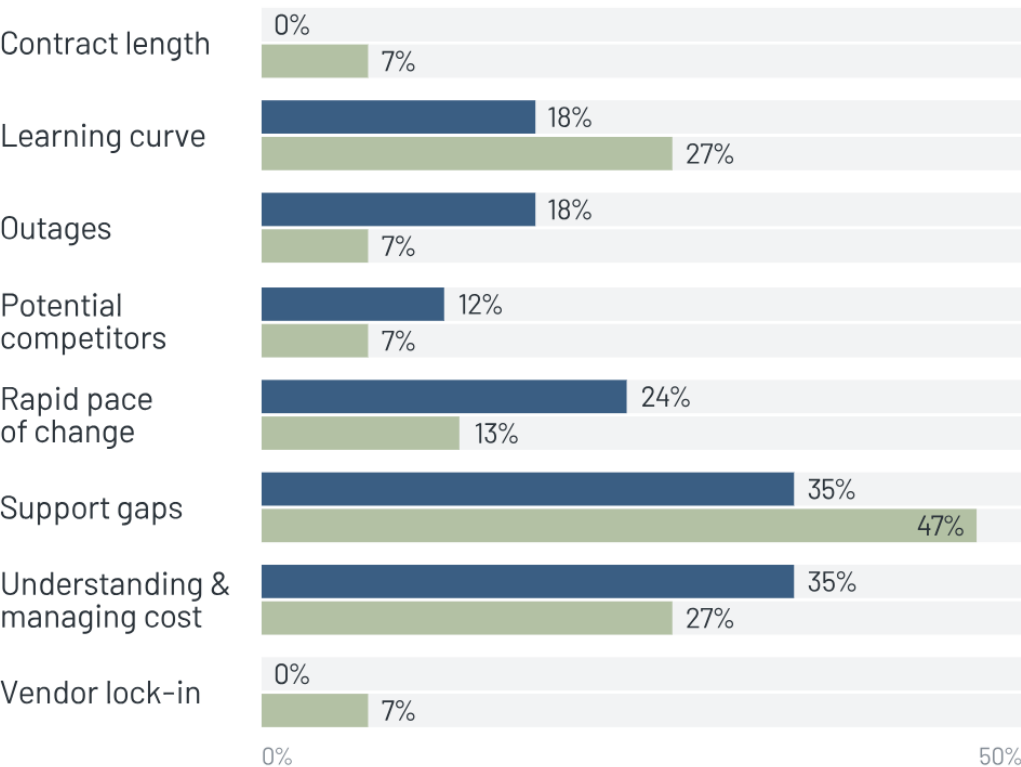
● AWS (n=24) ● Microsoft Azure (n=15)



## Support Gaps & Cost Management Are the Most-Mentioned Current Obstacles

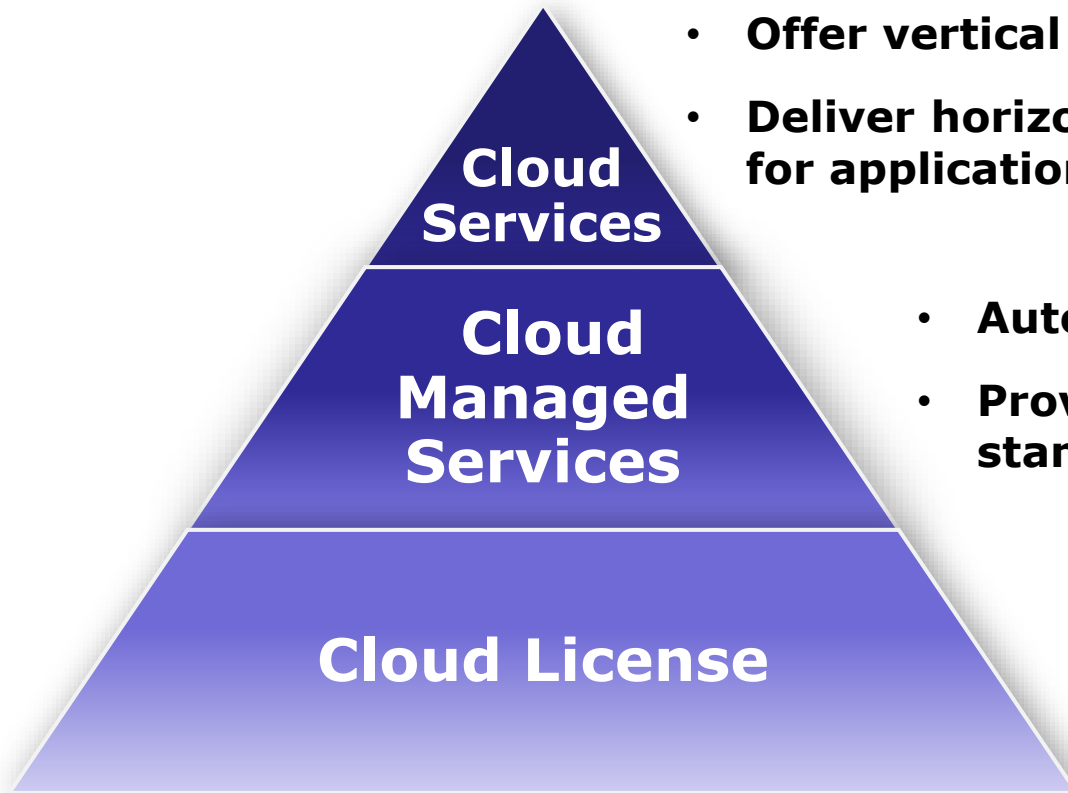
### What Obstacles Have You Encountered with Your Primary Cloud Provider?

● AWS (n=27) ● Microsoft Azure (n=15)





# InterSystems Cloud Strategy



- Offer vertical cloud services around a core standard for end users
- Deliver horizontal microservices with a common data repository for application development
- Automate implementation, operations and security
- Provide defined managed service offerings with standard commercial and contractual terms
- Make it easy for our customers and partners to deploy and maintain InterSystems software in their cloud of choice



# US Department of Veterans Affairs

## *Cloud License*



### **US Department of Veterans Affairs**

The VA provides life-long healthcare services to eligible military veterans through VA medical centers and outpatient clinics located throughout the country.

### **Challenge**

Integrate patient data from 130 different instances of an internally developed EMR system supporting 172 VA medical centers and 1,074 outpatient clinics to create a single, cloud based single source of truth for the health data for more than 9 million US military veterans.

### **Outcome**

The VA launched VDIF EP (Veterans Data Integration and Federation Enterprise Platform) to create and maintain longitudinal patient records by aggregating and normalizing clinical data from across its existing electronic medical record systems, operating in their AWS GovCloud account, managing more than 3 petabytes of healthcare data.

### **Cloud License (BYOL)**

Complementing VA's cloud-first strategy, the VA deployed and is managing VDIF EP on the Amazon Web Services (AWS) GovCloud. This significantly improves the ease and simplicity of provisioning resources, provides better storage latency, meets the government's security and compliance requirements, and provides the VA with the ability to deploy across multiple AWS GovCloud availability zones and regions.



# Harris Associates

## *Cloud Managed Services*



### **Harris Associates**

Harris Associates is a financial services asset management firm with \$94 billion in assets under management and owns and operates the Oakmark Funds mutual fund.

### **Challenge**

Speed, automate, and simplify the reporting and analysis of siloed data from multiple operational systems and streaming market data from market data providers.

### **Outcome**

Harris uses the **InterSystems TotalView for Asset Management service** to streamline and automate the integration, transformation, validation, reconciliation, analytics, and reporting of data from its various internal and external systems, and with market data from market data providers. The solution reduces latency from end of month to intraday and significantly reduces manual effort associated with reporting. It also provides internal stakeholders with the ability to drill into the data to get answers to ad hoc questions in a self-service manner. Harris also uses InterSystems Business 360 for Trade Cost Analysis, to predict the best trade execution for each trade using predictive analytics based on reams of historical trade execution and market data.

### **Cloud Managed Services**

The application is running completely in the Microsoft Azure Cloud in InterSystems cloud account. InterSystems manages the InterSystems Business 360 product environment and the Azure cloud infrastructure including compute, storage, networking, and access. Harris Associates manages their data, integration, business rules, dashboards, reporting, and other customization of the Business 360 application.



# North West London Integrated Care System

## *Cloud Services*



### **North West London Integrated Care System (NWL ICS)**

NWL brings together organisations, including local authorities, and partners responsible for the delivery and planning of health and care service within eight boroughs of northwest London, England.

### **Challenge**

Each facility had their own instance of an on-premise healthcare integration engine with all the complexities of system management local hardware, and data centers.

### **Outcome**

A single cloud instance allows for economies of scale, increased efficiency and reduced risk through shared resources. The organizations are collaborating through joint building of interfaces and re-using them across the Integrated Care System.

### **Cloud Services**

Complementing the NHS's cloud-first strategy, North West London migrated to **Health Connect Cloud**. With a shared pool of resources and InterSystems handling all system management and infrastructure requirements, North West London can focus on building interfaces more efficiently and possibly onboarding additional organizations seamlessly down the road.

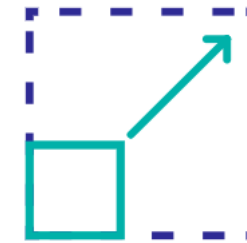
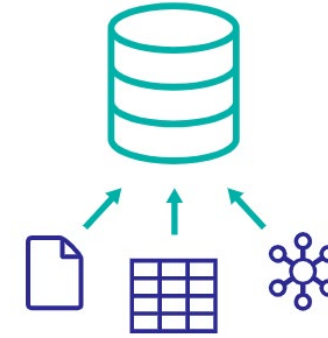


LONGEVICA



# Health Connect Cloud

- At the core of Health Connect Cloud is a high-performance, multi-model data engine that seamlessly handles multiple forms of data at high speed
- Health Connect Cloud easily scales from serving small hospitals to handling the transaction volumes of the world's largest and most complex healthcare delivery systems
- Hosted on AWS and available in the UK, US, and Europe regions





# HealthShare Health Connect Cloud Operations



## Provisioning

- Cloud Infrastructure Provisioning
- HealthShare Health Connect Deployment

## Ongoing Operations

- Backups and DB integrity checks
- Capacity & Performance Monitoring and Response

## Reporting

- Continuous monitoring of customer environment
- Capacity Planning, Trends and Analysis

## High Availability

- High-Availability Mirroring

## Data Security

- Database Encryption and SSL/TLS Comms
- Vulnerability Scanning

## Configuration Management

- Cloud Resource Provisioning and Data Retention
- CI/CD Pipeline and Source Control

## Support

- InterSystems iService 24/7/365
- SLA commitment of 99.9% availability

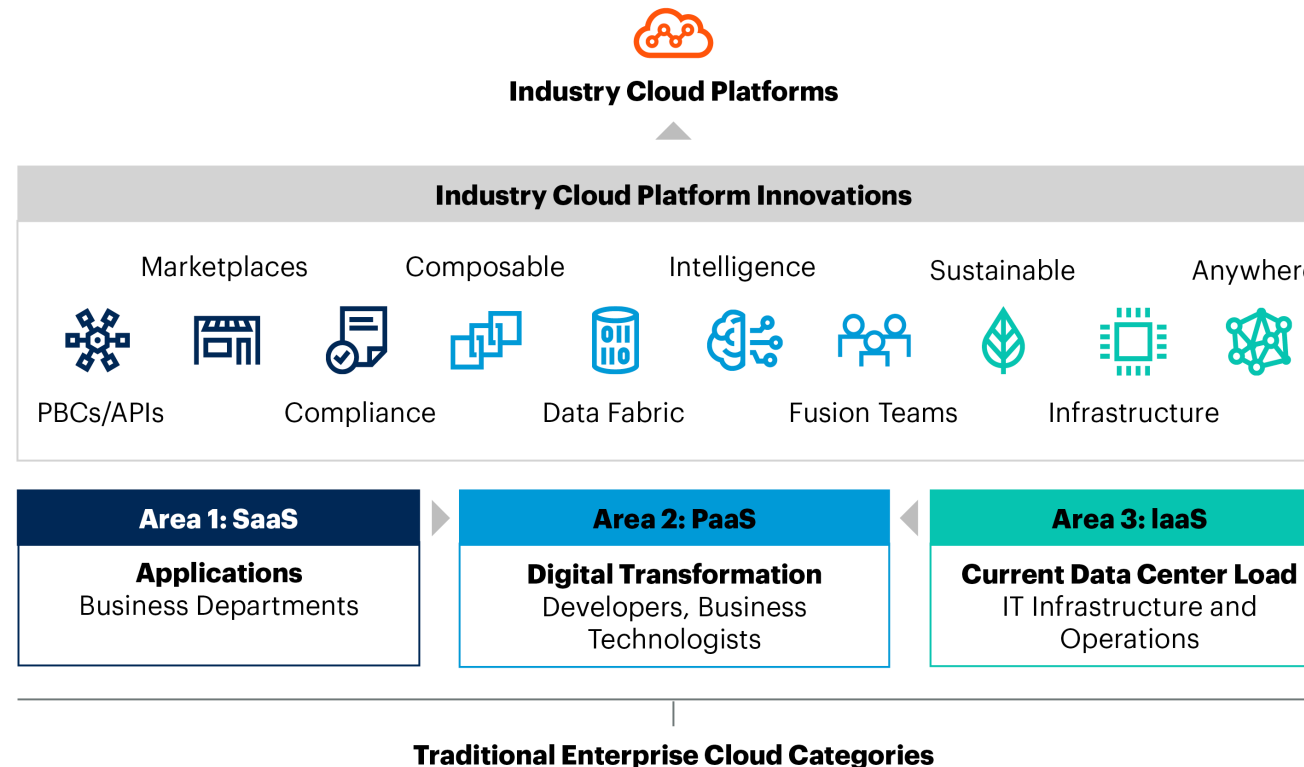


# Top Strategic Technology Trends for 2024: Industry Cloud Platforms

16 October 2023 - ID G00795600 - 20 min read



## Industry Cloud Platform Evolution



Source: Gartner  
772891\_C





# Quick Answer: InterSystems' Healthcare Industry Cloud Platform

18 July 2023 - ID G00791278 - 5 min read

By ck Andrade, Andrew Meyer

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Healthcare industry clouds offer diverse capabilities for buyers and opportunities for ecosystem partners. To help product leaders with planning and strategy, this research covers the mission, platform capabilities, ecosystem, partnerships and go-to-market approach of InterSystems' cloud platform.

[Reprint for InterSystems customers](#)







# Generative AI (genAI) and Large Language Models (LLMs)



## What Are LLMs:



**Magic?**



**Models trained on a variety of data**



**Sequence to Sequence Generators**



**Large HW Requirements**



**State of the Art Performance**

## Gen AI Examples



**OpenAI**

**stability.ai**



## Why they matter in HealthCare



LLMs matter in healthcare because they have the potential to revolutionize the way healthcare is delivered



LLMs can help healthcare organizations to analyze large amounts of data, generate insights, and automate tasks, leading to improved outcomes and reduced costs.



# Yale CEO Summit June 2023

When we surveyed CEOs on the field where they believe AI is likely to make the most transformative contribution, 48% of CEOs responded with **healthcare**

AI is uniquely poised to help address four major challenges which have historically plagued healthcare delivery:

- the tremendous variation among doctors and the way that they practice;
- the long lag time before doctors adopt new scientific information and practices;
- the lack of precision in being able to target the right diagnosis with the right treatment;
- and the inability of patients to make educated decisions given information barriers.

*former Veterans Affairs Secretary David Shulkin*



# An Interview with ChatGPT About Health Care

Many people are wondering how ChatGPT might be used in health care. So I asked it.

**Author:** David A. Asch, MD [Author Info & Affiliations](#)

NEJM Catalyst | April 4, 2023

## **What are the big opportunities for using ChatGPT in health care?**

There are several potential opportunities for using ChatGPT in healthcare:

1. Virtual assistants for patient care: ChatGPT could be used to create virtual assistants that can help patients schedule appointments, answer medical questions, and provide information on symptoms and treatments.
2. Clinical documentation: ChatGPT could be used to automate the process of creating clinical documentation, such as medical charts and progress notes, ...
3. Medical research: ChatGPT could be used to analyze large volumes of medical data and assist in the discovery of new treatments and cures.
4. Medical education: ChatGPT could be used to create interactive educational tools for medical students, ...
5. Patient engagement: ChatGPT could be used to create chatbot-based applications for patient engagement, providing patients with real-time feedback and support for self-management of their care.

<https://catalyst.nejm.org/doi/full/10.1056/CAT.23.0043>



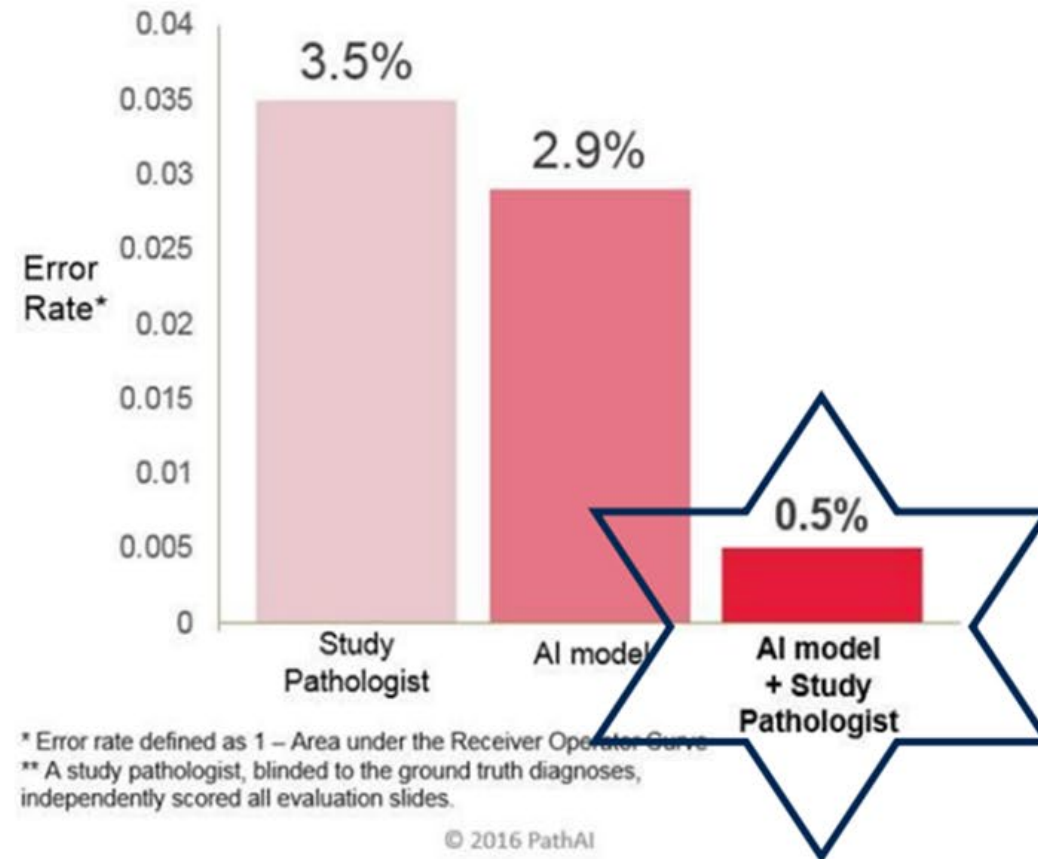
## Example: Augmented Intelligence - Human and Machine Collaboration

- Augmented intelligence emphasizes the assistive role of devices and algorithms in diagnosing and treating patients
- Augmented intelligence isn't intended to replace clinicians, but to make care delivery more accurate and efficient.

*"It's only going to become more obvious that doctors using their brains alone aren't going to be as good as brains combined with algorithms."*

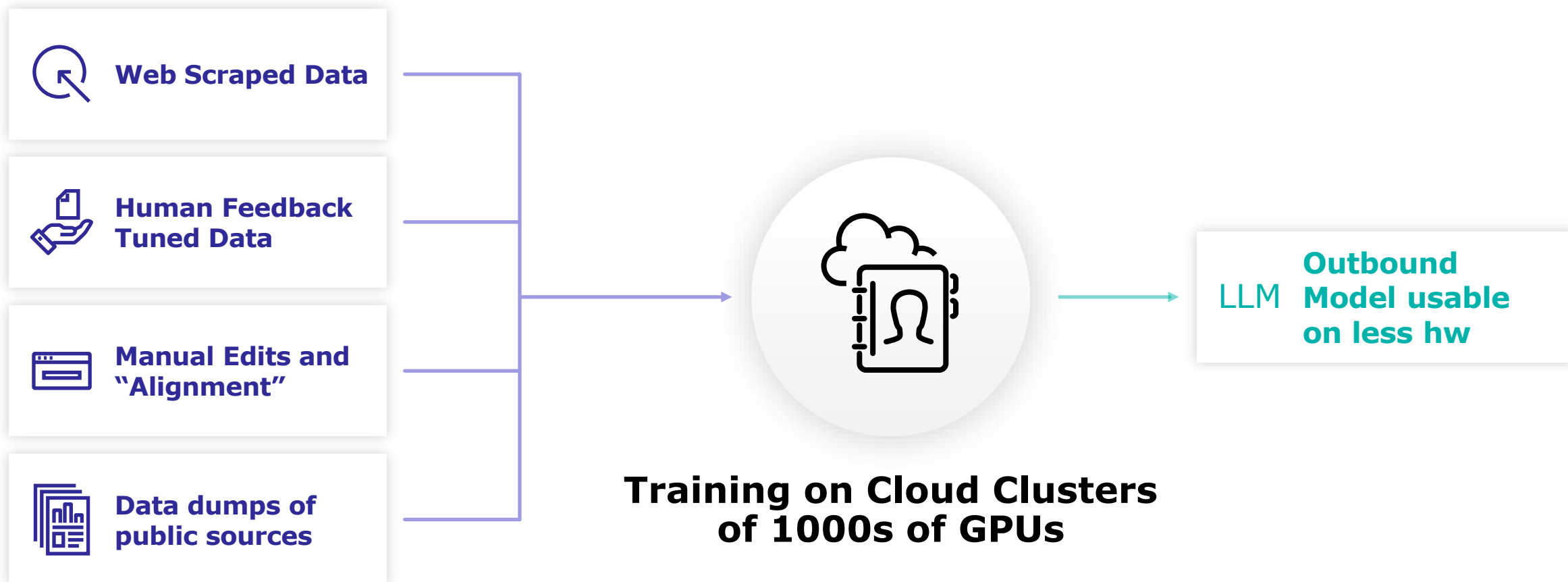
— Noga Leviner, CEO, PicnicHealth

(AI + Pathologist) > Pathologist





# LLMs are trained on a WIDE variety of sources



BUT: - not trained on your data, and not up to date

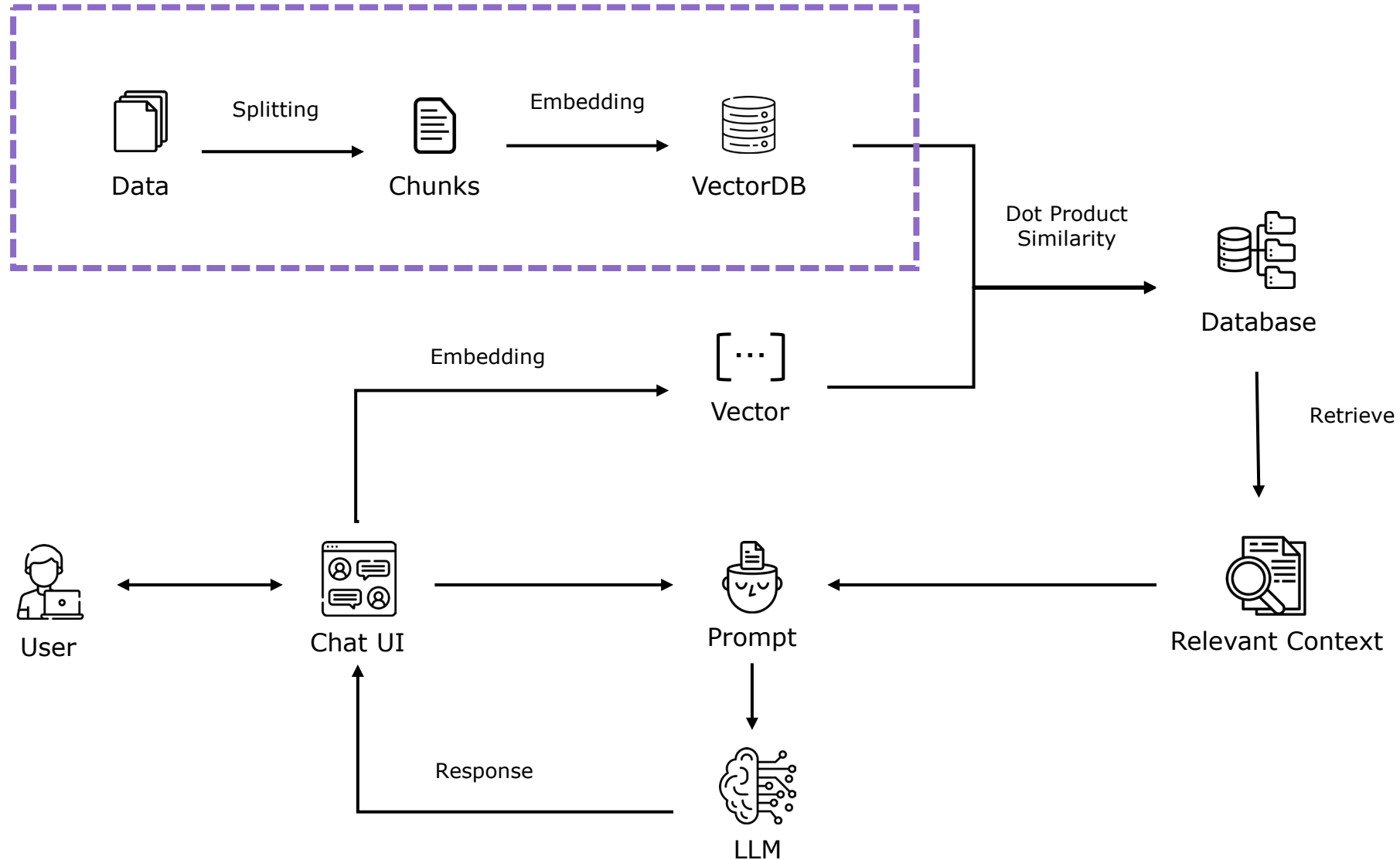
*GPT-4 cutoff date is January 2022*

- limited size for prompt + context + output

*GPT-4 limit is 8,192 tokens input+output; preview with 128K total/4K output*

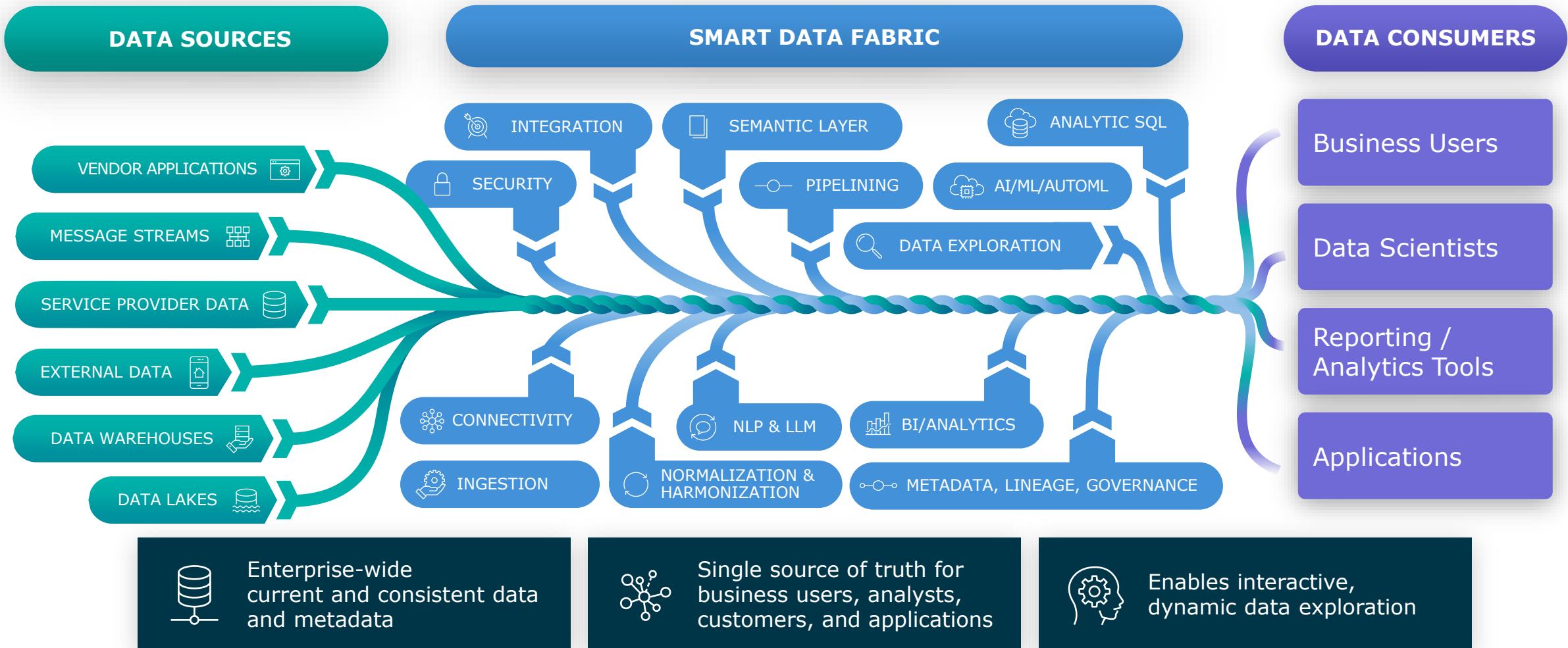


# Retrieval-Augmented Generation (RAG) Pattern



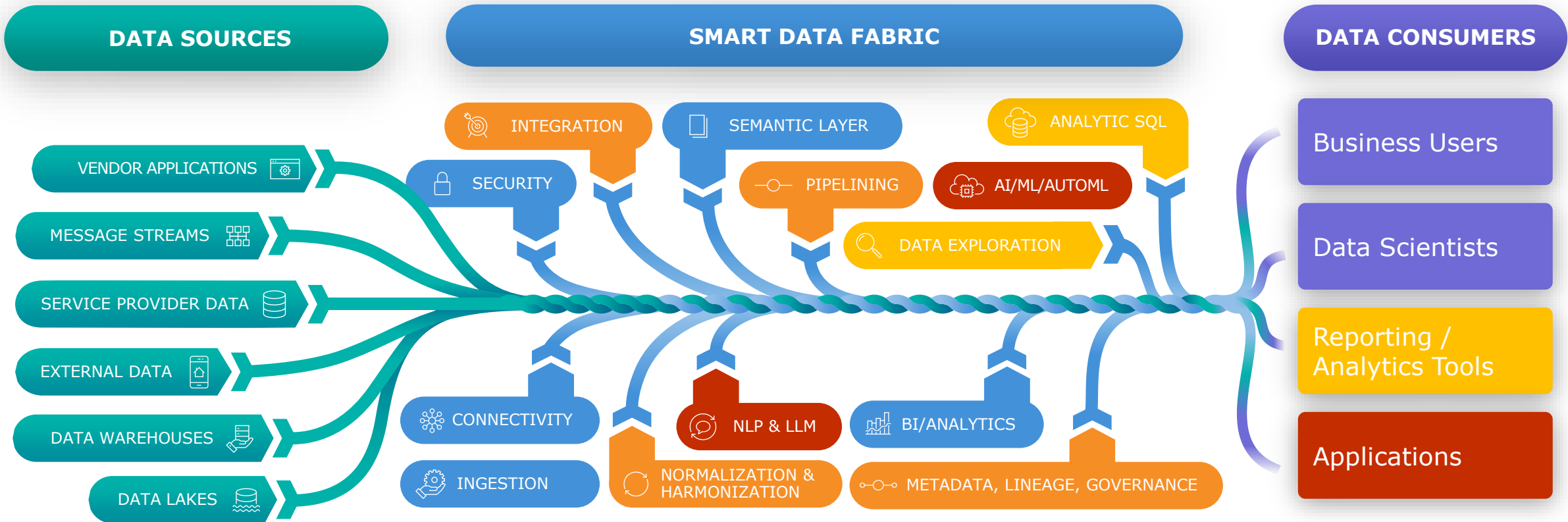


# Smart Data Fabric





# Smart Data Fabric with GenAI



■ genAI mechanics   ■ UX/Chat interactions   ■ Data Automation








Source

Target


▶ ▾ target

| Condition | Property | Value | Key / Transform |
|-----------|----------|-------|-----------------|
|           |          |       |                 |


Tools for working with Data Transformati

- 

Test

Test this Data Transformation.
- 

DTL Generator

DTL generator
- 

DTL AI Helper

DTL AI Helper





# ML and GenAI to Improve Patient Communications



# Patient Portal Messages Overwhelm Health Systems



## Want to message your doctor on MyChart? Cleveland Clinic may bill you, insurance



**Betty Lin-Fisher**

Akron Beacon Journal

Published 12:17 p.m. ET Nov. 15, 2022 | Updated 4:10 p.m. ET Nov. 17, 2022



## UC San Diego Patient Portal Message

50,000/month, before pandemic

80,000/month, after pandemic

140,000/month, during pandemic

**2.32** Minutes in  
EHR Per Patient  
Message

<https://academic.oup.com/jamia/article/29/3/453/6458072>

[HEALTH AFFAIRS](#) > [VOL. 38, NO. 7](#): PHYSICIANS, NURSES, DISPARITIES & MORE

Physicians' Well-Being Linked To In-Basket Messages Generated By Algorithms In Electronic Health Records

[https://www.wsj.com/articles/dr-chatgpt-physicians-are-sending-patients-advice-using-ai-945cf60b?st=mp7wkqca8lrk371&reflink=desktopwebshare\\_permalink](https://www.wsj.com/articles/dr-chatgpt-physicians-are-sending-patients-advice-using-ai-945cf60b?st=mp7wkqca8lrk371&reflink=desktopwebshare_permalink)



# Baystate Health

ADVANCING CARE. ENHANCING LIVES.

Baystate Health is nationally recognized as a leader in healthcare quality and safety. Baystate has been providing compassionate care in western Massachusetts for more than 145 years with roots dating back to the founding of Springfield City Hospital in 1873.



CARING FOR A  
**POPULATION OF  
MORE THAN 800K**  
IN WESTERN MASS



**5**  
HOSPITALS

NEARLY  
**13,000**  
EMPLOYEES



**700<sup>+</sup>** EMPLOYED  
PHYSICIANS  
**850<sup>+</sup>** COMMUNITY  
PHYSICIANS

**80**  
MEDICAL PRACTICES

Patient Portal is  
based on Personal  
Community

Patient messages  
triaged by central  
contact center team

About **1,000**  
messages per day

About half are  
general/medical  
questions

Urban Health Centers | Home Care Services | Hospice Services

UMass Chan Medical School - Baystate



# Use Cases



**Navigation  
Assistance**



**Urgent Message  
Prioritization**



**Message  
Summarization**



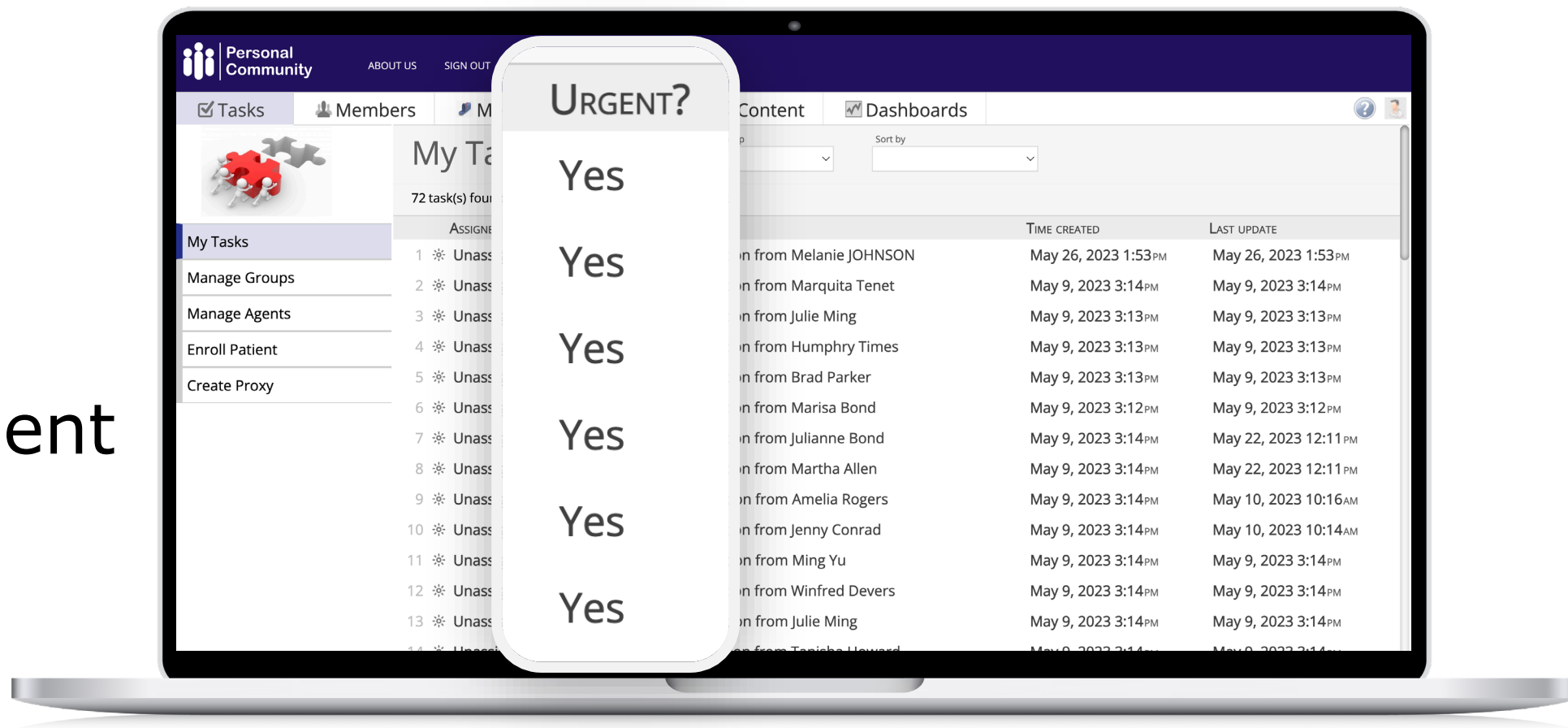
**Suggested  
Responses**







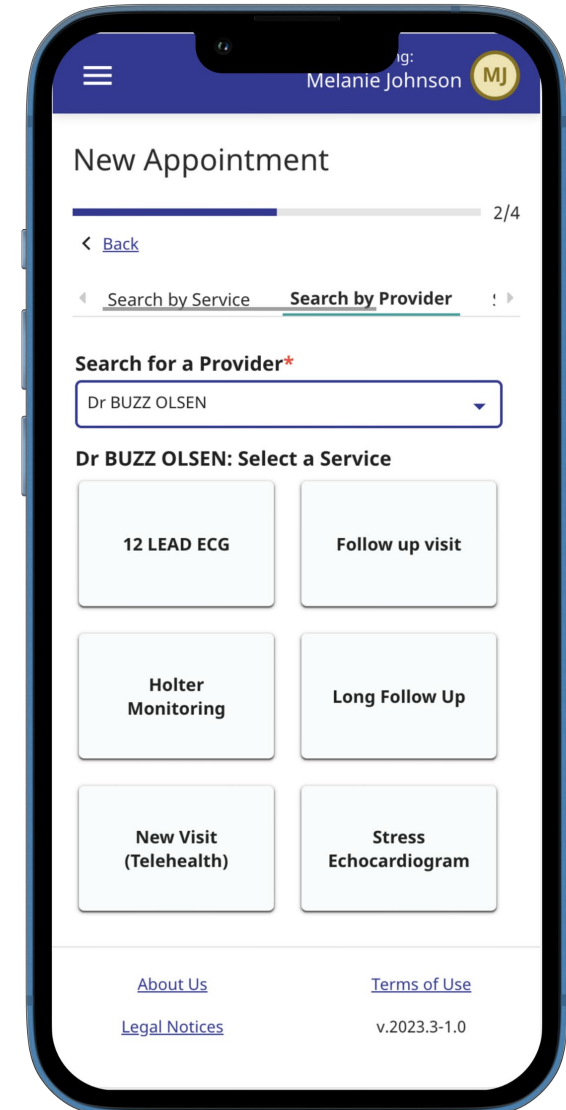
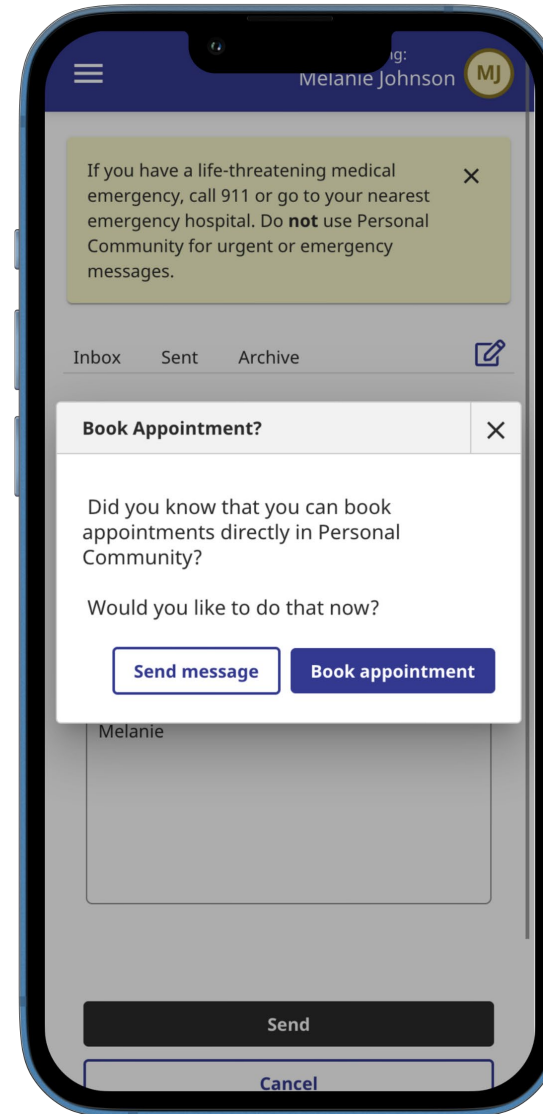
# Urgent Message Management





# Patient Portal and GenAI

## Navigation Assistance





# Patient Portal and GenAI



## Summarization

Personal Community

ABOUT US

SIGN OUT

Tasks

Members

Me

My Tasks

Manage Groups

Manage Agents

Enroll Patient

Create Proxy

72 task(s) found

ASSIGNED

1 ✖ Unassigned

2 ✖ Unassigned

3 ✖ Unassigned

4 ✖ Unassigned

5 ✖ Unassigned

6 ✖ Unassigned

7 ✖ Unassigned

8 ✖ Unassigned

SUMMARY TEST

COVID-like symptoms

potential bite

COVID symptoms

urinary problem

multiple medical issues

request appointment

discuss lab results

request for therapist recommendation

Time Created

Last Update

tion from Melanie

May 26, 2023 1:53 PM

May 26, 2023 1:53 PM

tion from Marquita

May 9, 2023 3:14 PM

May 9, 2023 3:14 PM

tion from Julie Ming

May 9, 2023 3:13 PM

May 9, 2023 3:13 PM

tion from Humphry

May 9, 2023 3:13 PM

May 9, 2023 3:13 PM

tion from Brad Parker

May 9, 2023 3:13 PM

May 9, 2023 3:13 PM

tion from Marisa Bond

May 9, 2023 3:12 PM

May 9, 2023 3:12 PM

tion from Julianne Bond

May 9, 2023 3:14 PM

May 22, 2023 12:11 PM

tion from Martha Allen

May 9, 2023 3:14 PM

May 22, 2023 12:11 PM



# Patient Portal and GenAI

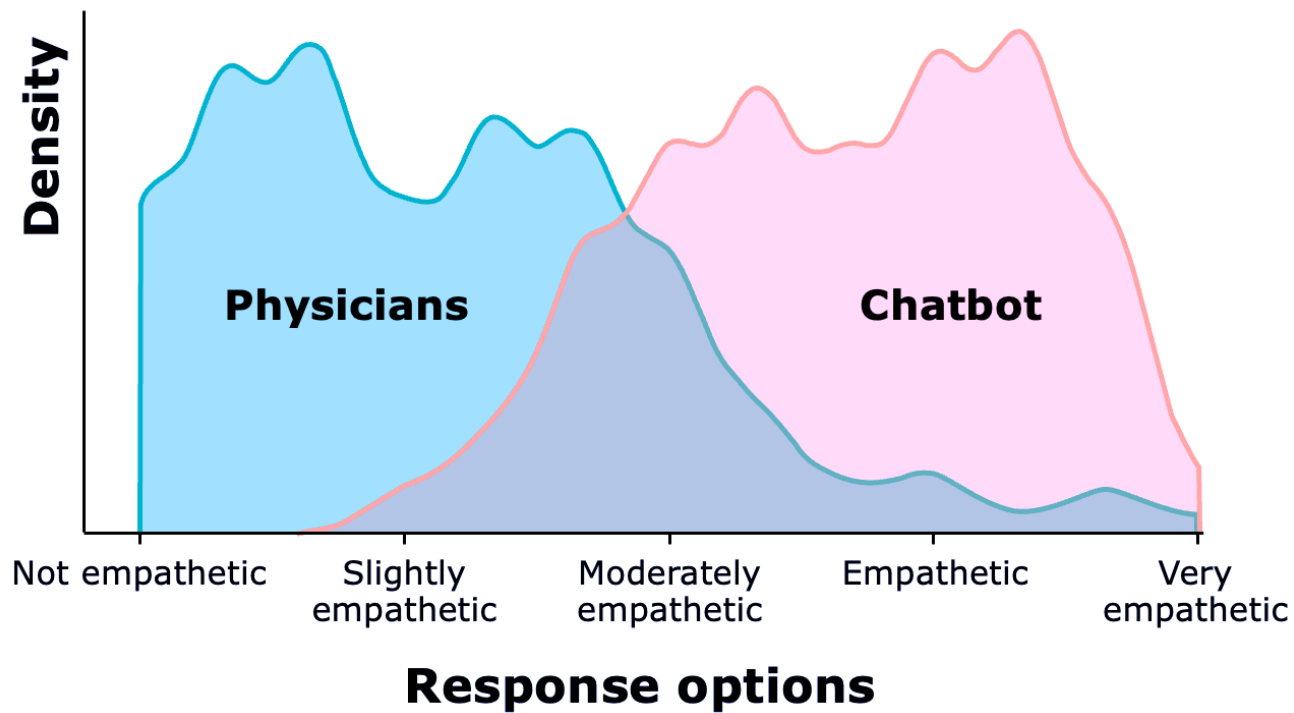


## Suggested Response

A screenshot of a patient portal interface. The top navigation bar is dark blue with the text "Personal Community" and links for "ABOUT US", "SIGN OUT", and "SIGNED IN AS: WBADMIN". Below this is a secondary navigation bar with tabs for "Tasks", "Members", "Messages", "Setup", "Content", and "Dashboards". The main content area shows a "My Tasks" section with a red puzzle piece icon and a text input field labeled "Enter an answer to the question". Below this is a "Subject" field. A large white box with a light gray border contains a suggested response template. The template starts with "Answer\*", followed by "Dear Patient," and three paragraphs of text. The first paragraph thanks the patient for reaching out and expresses understanding of their anxiety. The second paragraph suggests discussing the anxiety with a primary care physician or a mental health professional. The third paragraph offers to help schedule an appointment. The template ends with "Best regards," and "[Your Name]". At the bottom of the white box are four buttons: "Complete", "Save", "Discard", and "Back".



# JAMA Comparison Of Physicians To Chatbots

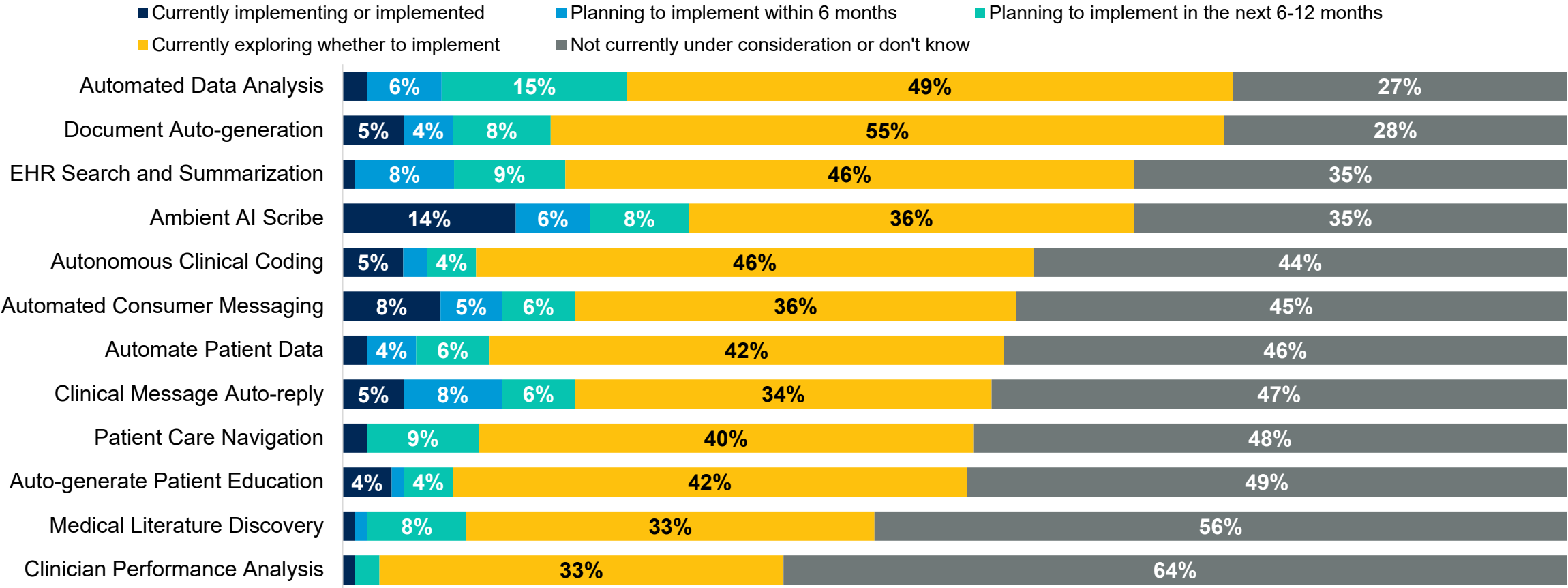


Empathetic or very empathetic responses: Physicians 4.6% vs. Chatbot 45.1%

Preferred in 78.6% of responses



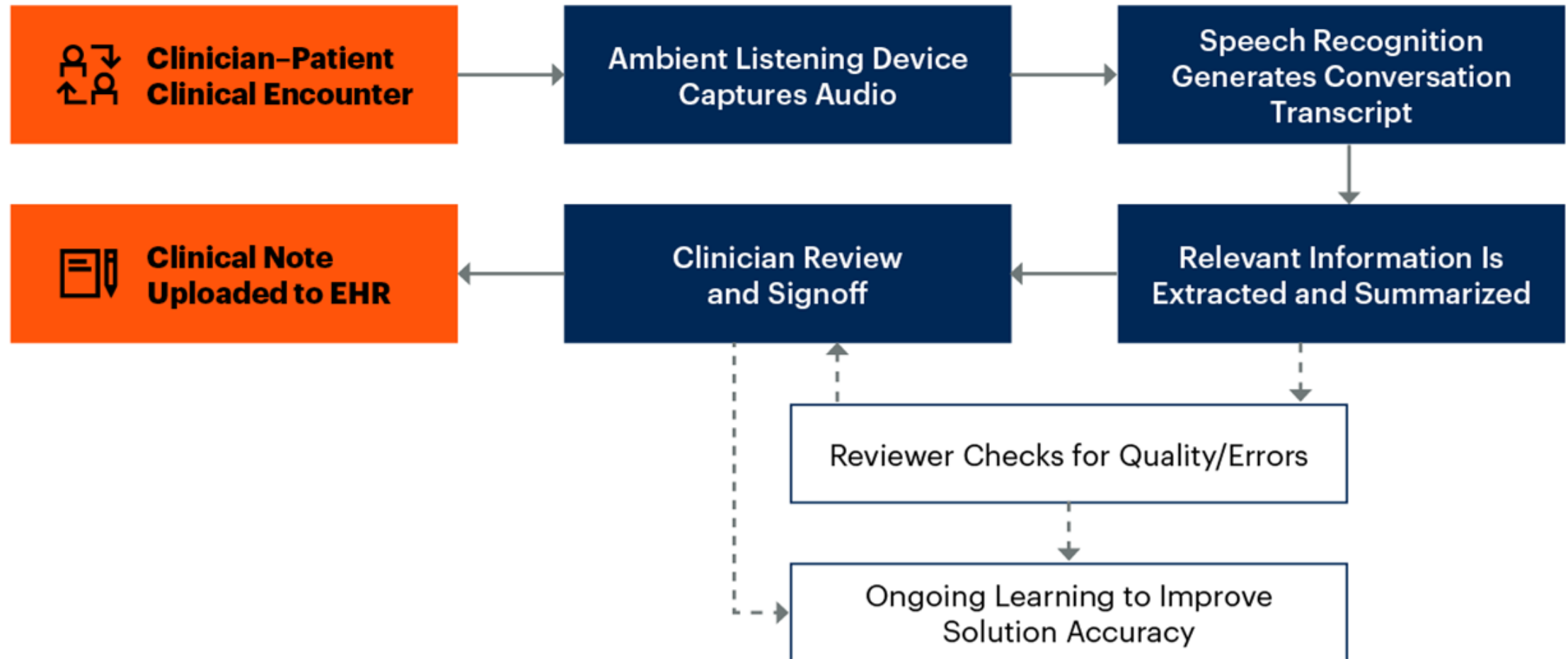
# What getAI use cases are Healthcare Providers focused on?





# Ambient Digital Scribe

— Core Process    - - Optional Additional Process



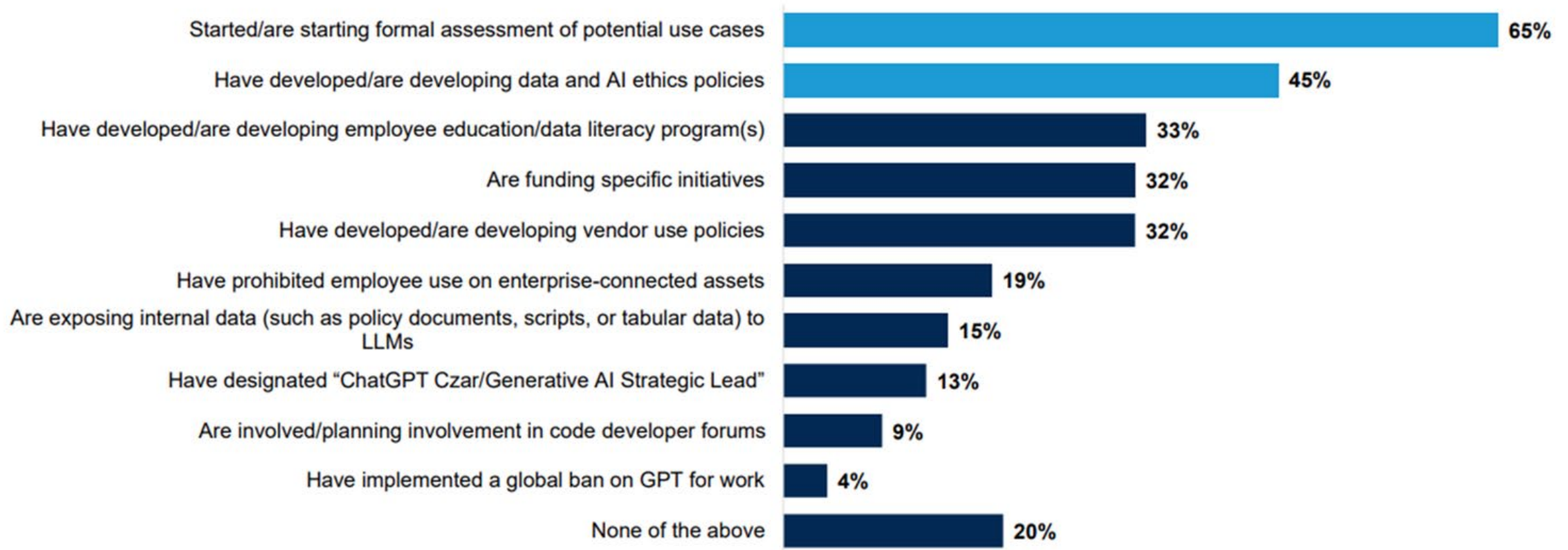
Source: [Innovation Insight: Ambient Digital Scribes Reduce Clinical Documentation Burden](#)

RESTRICTED



# Actions Taken on LLM Applications: Healthcare Providers

Actions Organizations Have Taken on Large Language Model (LLM) Applications Today (Select All that Apply)  
Percentage of Healthcare Provider Executives



n = 85 Healthcare Provider Executives  
Source: Gartner Healthcare Provider Research Panel Survey, June 2023  
Q: Which of the following apply to your organization's actions on generative AI-enabled LLM today? Please select all that apply.

RESTRICTED



## Recap: Selected Trends



- Digital Health Platforms & Data Fabric in Health Care
- Cloud Adoption & Healthcare Clouds
- Generative AI in Healthcare



# Thank you

Optional details