KLAS

KLAS Arch Collaborative Update and Emerging Technology Insights

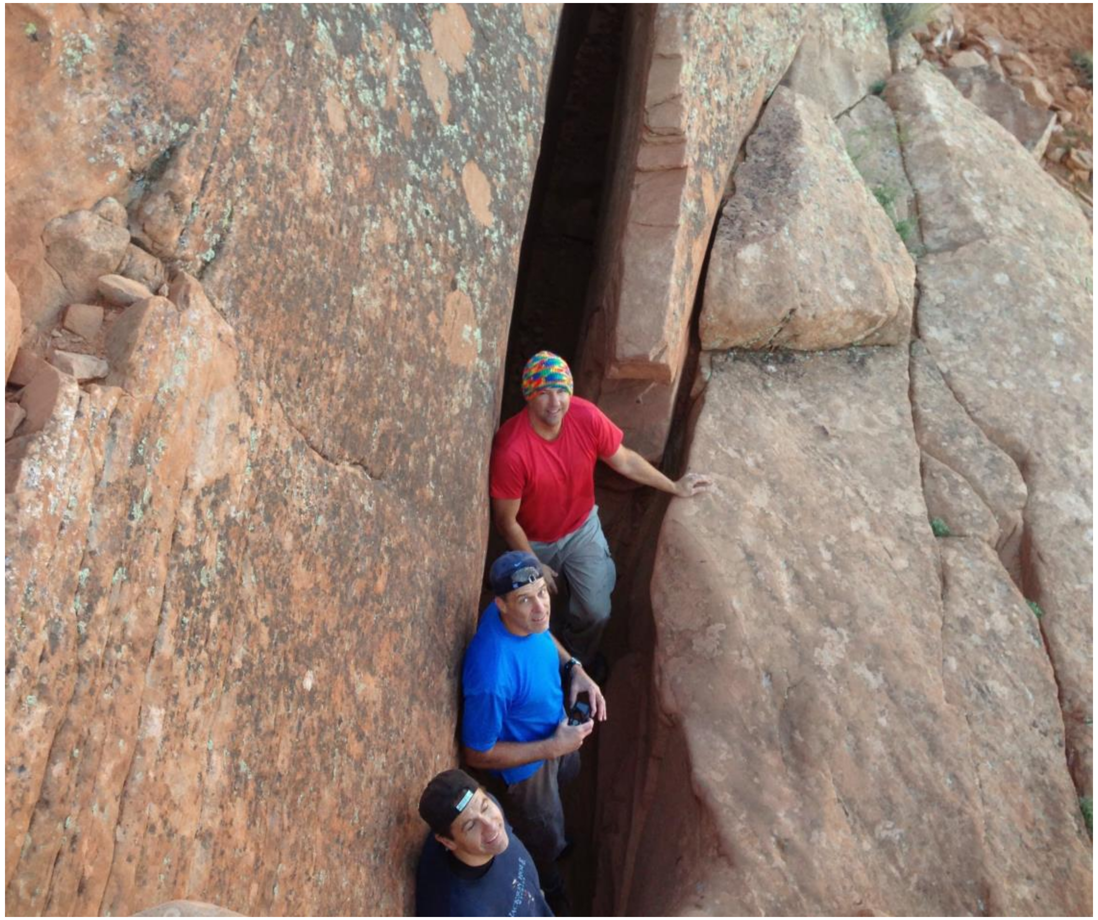
AMDIS – Physician-Computer Connection Symposium

June 8-11, 2021

KLAS® Arch collaborative Update

- Brief Overview
- Membership Status
- Consistent Findings
  - Strong User Mastery
  - Shared Ownership
  - Meets Unique User Needs
- Recent Findings
  - JAMIA – Burnout
  - Shared Ownership – Trust in IT
  - ROI – Training and Efficiency, Burnout, Retention

Arch Collaborative Update



KLAS®

Arch Collaborative Beginnings

KLAS Arch Collaborative Beginnings

Arch Collaborative

250 organizations,
Over 200,000 clinical responses[a]

Same EHR satisfaction questions . . .

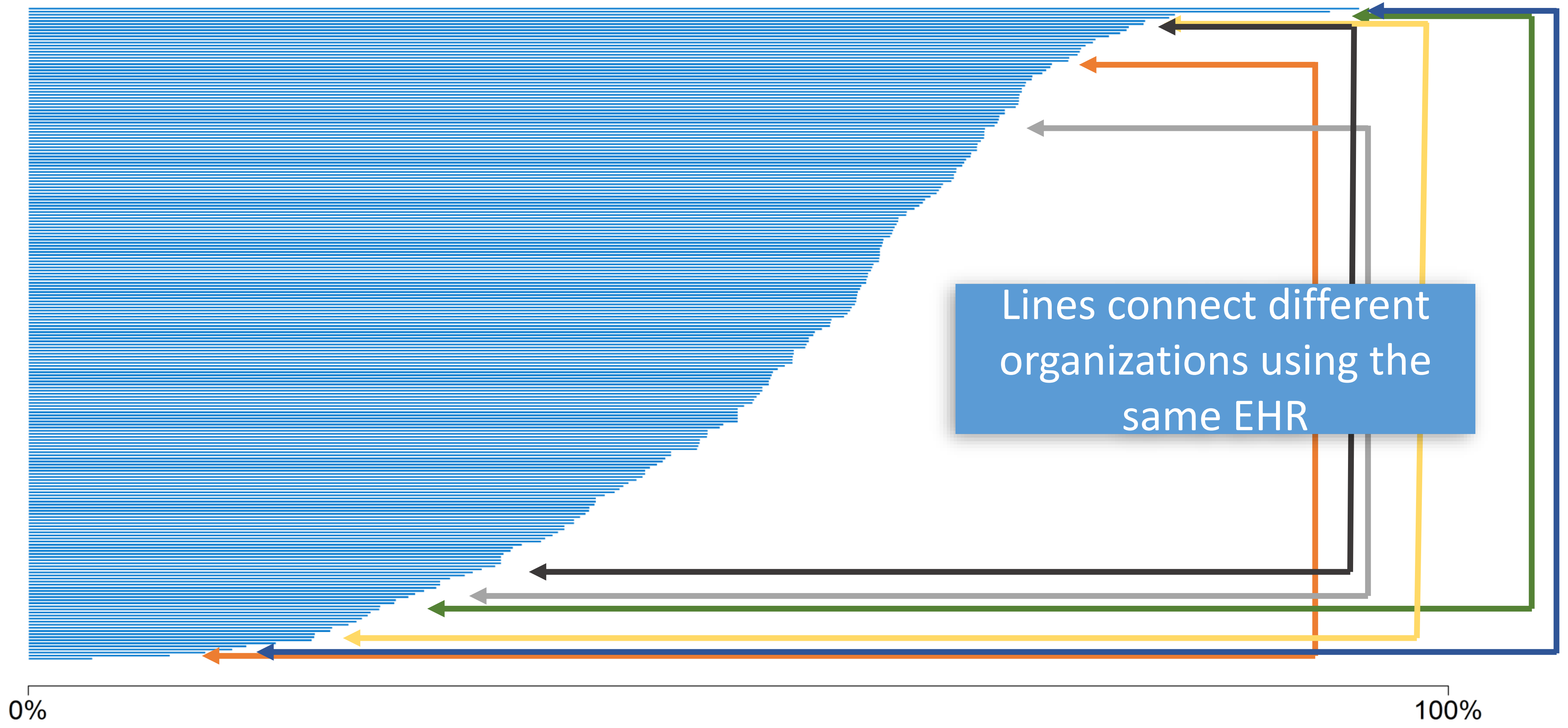
Do you agree that your EHR…

1. is available when you need it (has almost no downtime)
2. has the fast system response time you expect
3. provides expected integration within your organization
4. provides expected integration with outside organizations
5. has the functionality for your specific specialty/clinical care focus
6. is easy to learn
7. makes you as efficient as possible
8. enables you to deliver high-quality care
9. keeps your patients safe
10. allows you to deliver patient-centered care
11. has alerts that prevent care delivery mistakes

KLAS

Percent of Providers Who Agree Their EHR Enables Quality Care

n = 39,072 providers from 189 organizations: each bar is an EHR deployment with >20 responses



Where Does the Variation Come From?

From the EHR vendor?

Develop EHR Better

The organization?

Implement and Configure Better

The clinician users?

Work with Clinicians Better

Where does the Variation Come From?

EHR Vendor	Organization	Clinician Users
22%	18%	60%

KLAS® Arch Collaborative Membership Status

- 124 members
  - 109 domestic
  - 15 international
- 16 vendor partners
- 21+ new participants in 2021
- 39 organizations in data collection
  - – Arch, Pre/Post, or Trainer Quality
- 15 new case studies underway
- 4 reports either complete or nearing completion

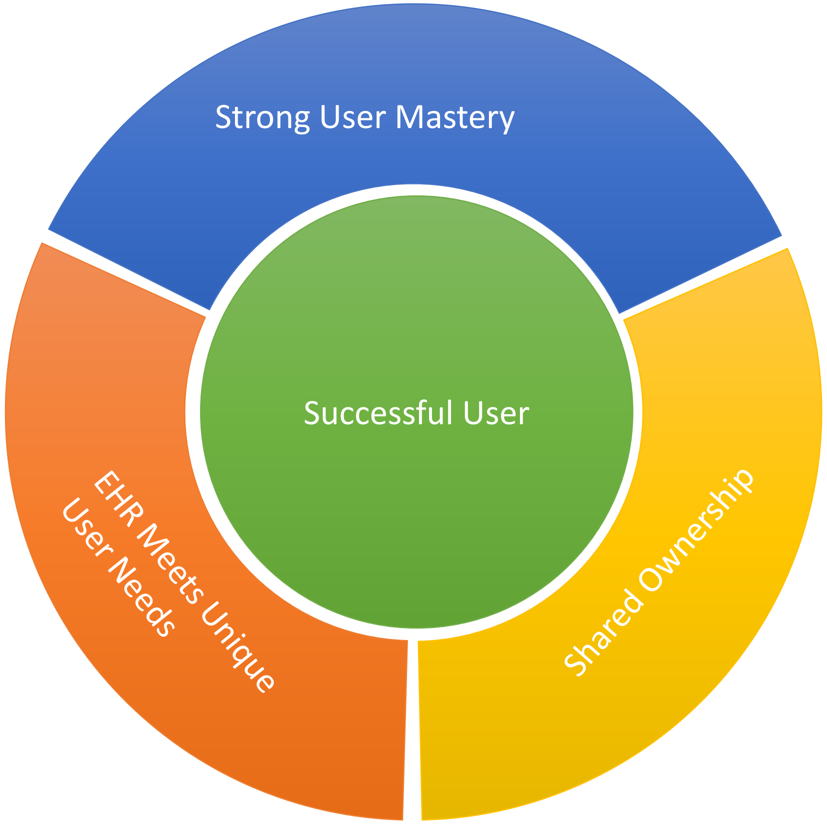
New Members

- OhioHealth
- SCL Health
- Billings Clinic
- Mercy Health
- Arkansas Children's
- Cottage Health
- Southern Illinois Healthcare
- Adventist Health
- Indiana Primary Health Care Association
- Summit Healthcare Regional Medical Center
- Virtua Health
- Piedmont Healthcare
- MultiCare Health System
- Meritus Health
- Boston Children's Hospital
- MetroHealth System
- Confluence Health
- Carle Health

KLAS® Consistent Findings - What Makes a Successful User?

I am confident in my ability to use this EHR effectively and efficiently.

- Initial Training
- Ongoing Training



We have gotten this EHR to a great place where it meets my specific needs. I have taken the time so that it works how I need it to.

- Personalization
- Strong system for support
- Adequate “expert” resource

I feel I have the ability to influence the team shapes this EHR. My voice is heard, and I am seeing progress as we shape this into a successful solution.

- Teamwork Culture
- Involvement in Decision-Making
- Trust in IT

KLAS® Key Process to EHR Improvement

Successful organizations rarely use **the same playbook**, but all follow similar principles.

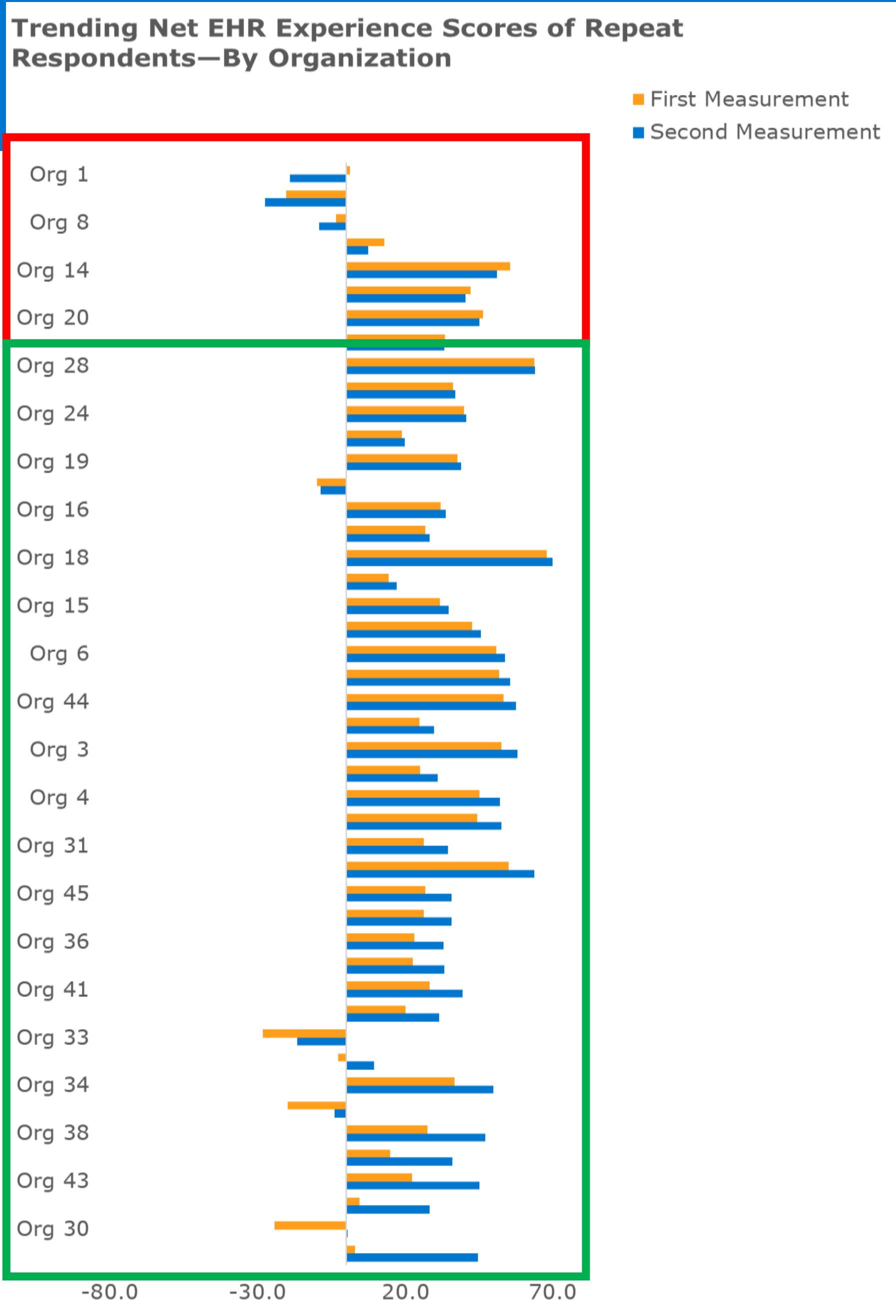
Measurement and Benchmarking tools to **build a successful plan**

Measure all Key areas of Clinical Satisfaction with the EHR

Make Improvements Based Upon Findings from Measurement

2nd Measurement to Understand where Clinical Satisfaction Improved

Arch Repeat Measurement



38 of 46 (82%)organizations who remeasured improved

27 (59%) with statistically significant improvement!

Recent Findings - JAMIA Burnout Article

- Analyzed **associations between self-reported burnout and after-hours charting and organizational EHR support**
- Examined how these relationships **differ by medical specialty**
- Physicians reporting **≤ 5 hours weekly of after-hours charting were twice as likely to report lower burnout** scores compared to those charting ≥6 hours
- Physicians who agree that their **organization has done a great job with EHR implementation, training, and support were also twice as likely to report lower** scores on **burnout** compared to those who disagree

Recent Findings - Trust in IT

- Providers who **strongly disagree that their organization/IT leadership delivers well** are **~85x more likely to report a poor EHR experience** than those who strongly agree

- **Higher EHR satisfaction** is tied to the belief that **IT is trying to improve the EHR**

CLINICIAN TRUST IN ORGANIZATION/IT LEADERSHIP

A clinician's trust in their organization and IT leadership can greatly impact their EHR experience. To measure this trust, the Arch Collaborative EHR Experience Survey asks end users whether they agree their organization and IT leadership have done a great job of implementing, training on, and supporting the EHR. A number of factors—for example, training, burnout, and EHR governance structure—affect how clinicians answer this question. The Executive Insights section of this report examines the outcomes of clinician trust and shares a high-level view of what drives it. The Expanded Insights section dives deeper into the relative importance of various factors on clinician trust and what practices help end users feel supported by their organization when it comes to the EHR experience.

Trust in Organization/IT Highly Correlated with EHR Experience

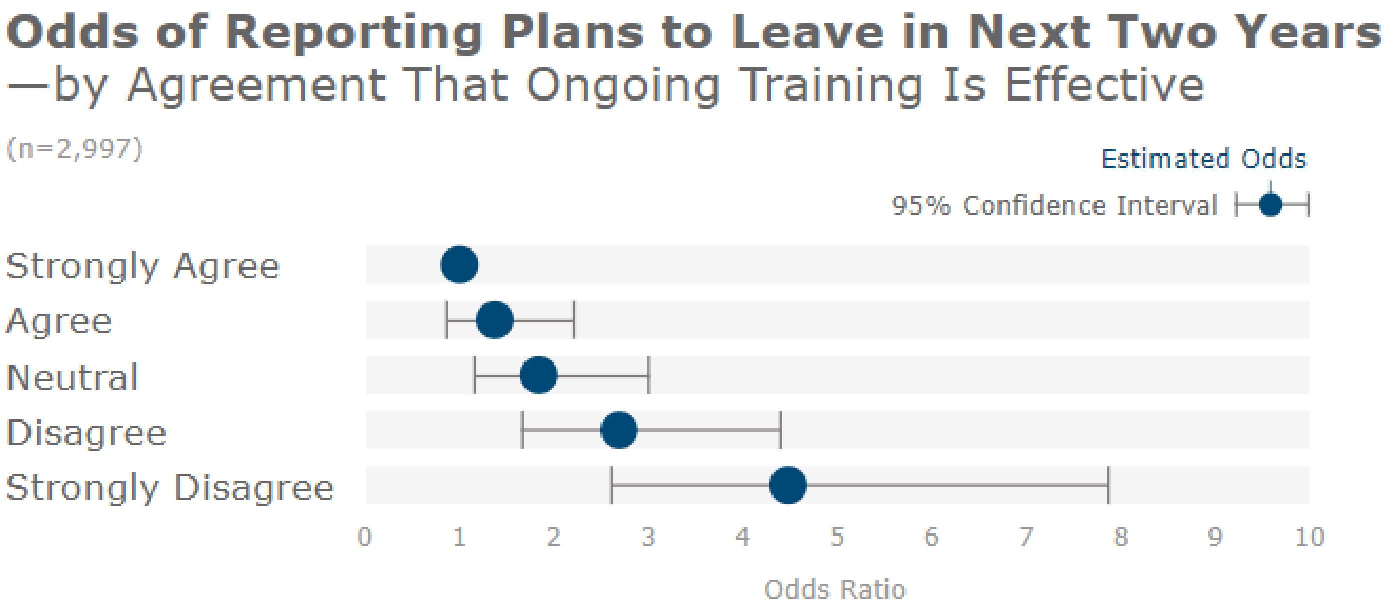
KLAS® Recent Findings - Why Invest in Measurement?

Arch Collaborative ROI Study

Higher Retention†

Those who **strongly disagree that their ongoing training experience was helpful** and effective are over **four times more likely to state that they are planning to leave their organization** in the next two years.

† The AMA estimates that losing a physician costs an organization two to three times the physician's annual salary.



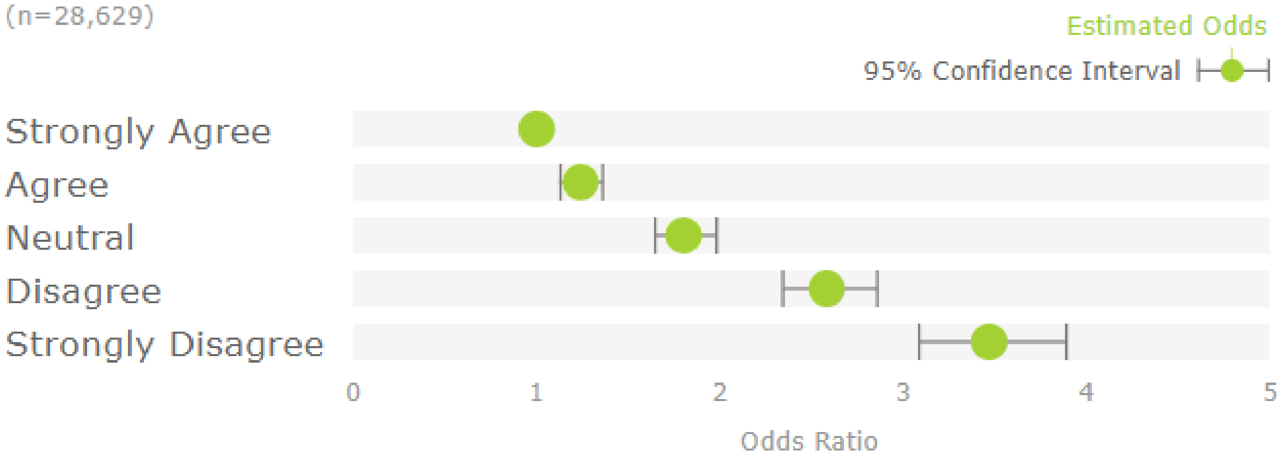
KLAS® Why Invest in Measurement?

Arch Collaborative ROI Study

Reduced Burnout

Those who **strongly disagree that their ongoing training experience is helpful** and effective are **three and a half times more likely to state that they are completely burned** out (i.e., at the point where they may need to seek help).

Odds of Reporting Complete Burnout
—by Agreement That Ongoing Training Is Effective



KLAS Why Invest in Measurement?

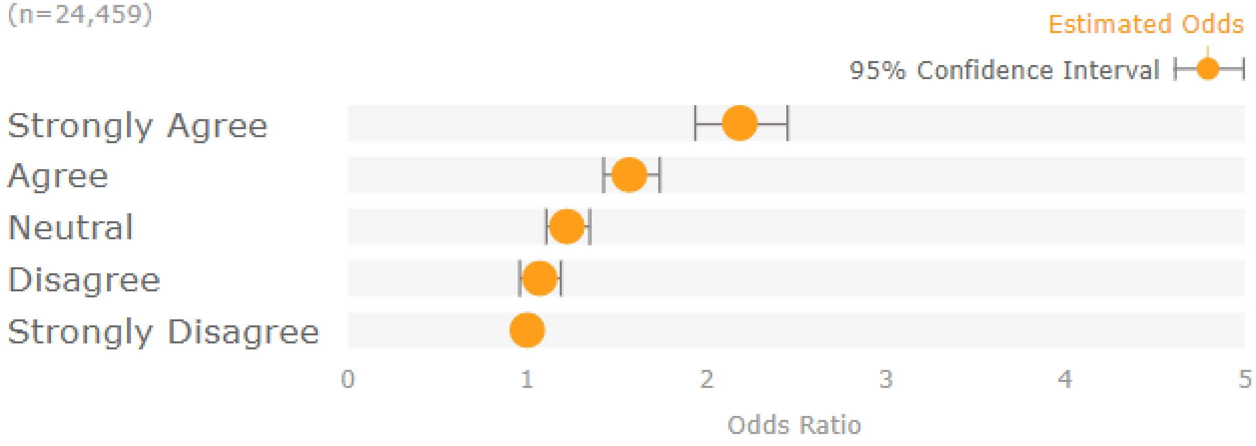
Arch Collaborative ROI Study

Improved Efficiency

Clinicians who **strongly agree that their ongoing training is helpful** and effective are **over two times more likely to report immediate chart-closure rates above 90%.**

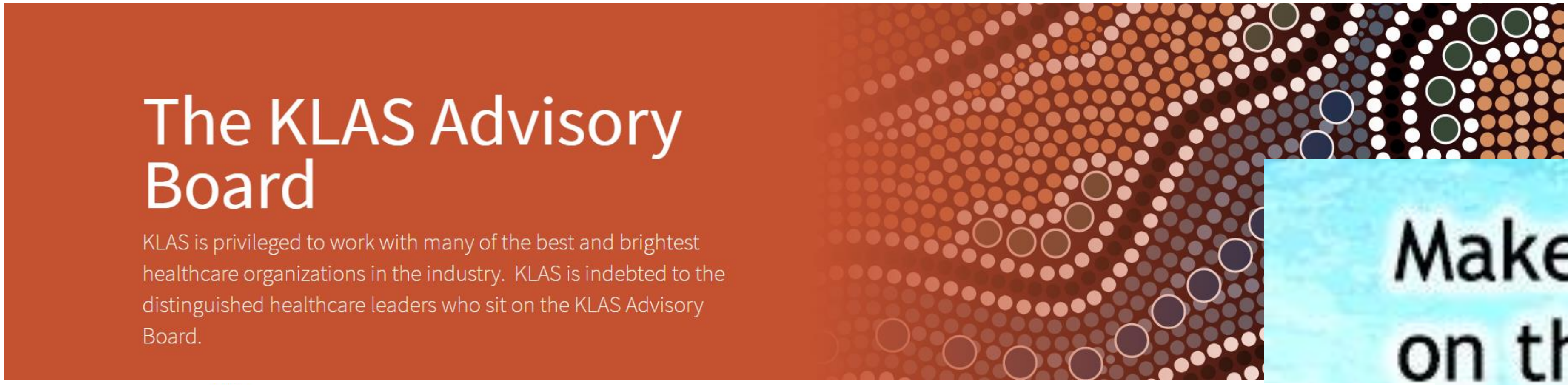
Odds of Reporting a Chart-Closure Rate >90%
—by Agreement That Ongoing Training Is Effective

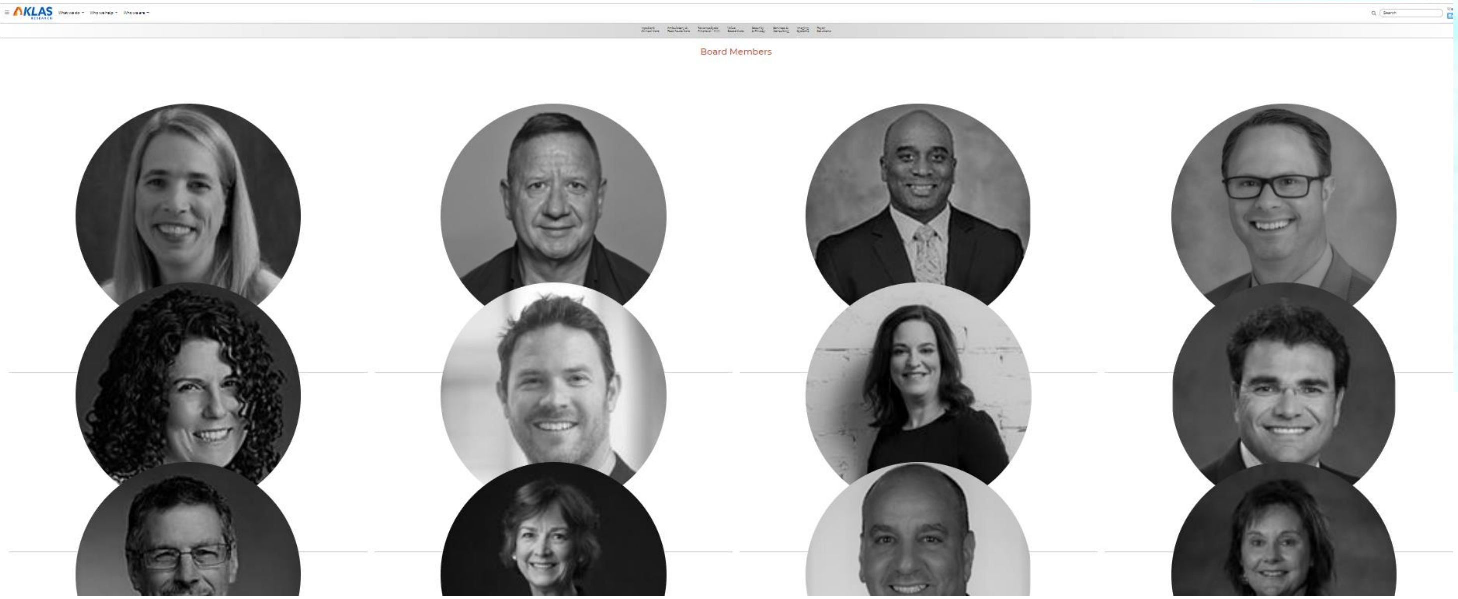
(n=24,459)



Emerging Technology

KLAS® Inquiries for and Advice on eTech





KLAS Hot Topics in eTech

- **Patient Engagement**
- Social Determinants of Health
- **Telehealth/Virtual Care**
- Robotic Process Automation (RPA)
- Digital Documentation
- **Revenue Cycle Management**

Odds and Ends

- Physician Workflow
- Security
- Artificial Intelligence
- Vaccine Distribution
- Payer Interoperability
- Risk Adjustment and Analytics

KLAS separates hype from reality with the following eTech Solutions.

Emerging Technology
SEGMENTS

Spotlights
REPORTS

HCIT Company
DIGESTS

eTech Insights
ARTICLES

Patient Engagement

- blockit
- DOCASAP
- Force
- GYANT
- Okadoc
- pb
- Phynd
- QUIL
- radixhealth
- Uber Health
- UPFRONT
- xealth

Social Determinates of Health (SDoH)

- ALGOREX
- auntbertha
- CARROT HEALTH
- Healthify
- NOWPOW
- signifyhealth
- SOCIALLY DETERMINED
- UNITE US

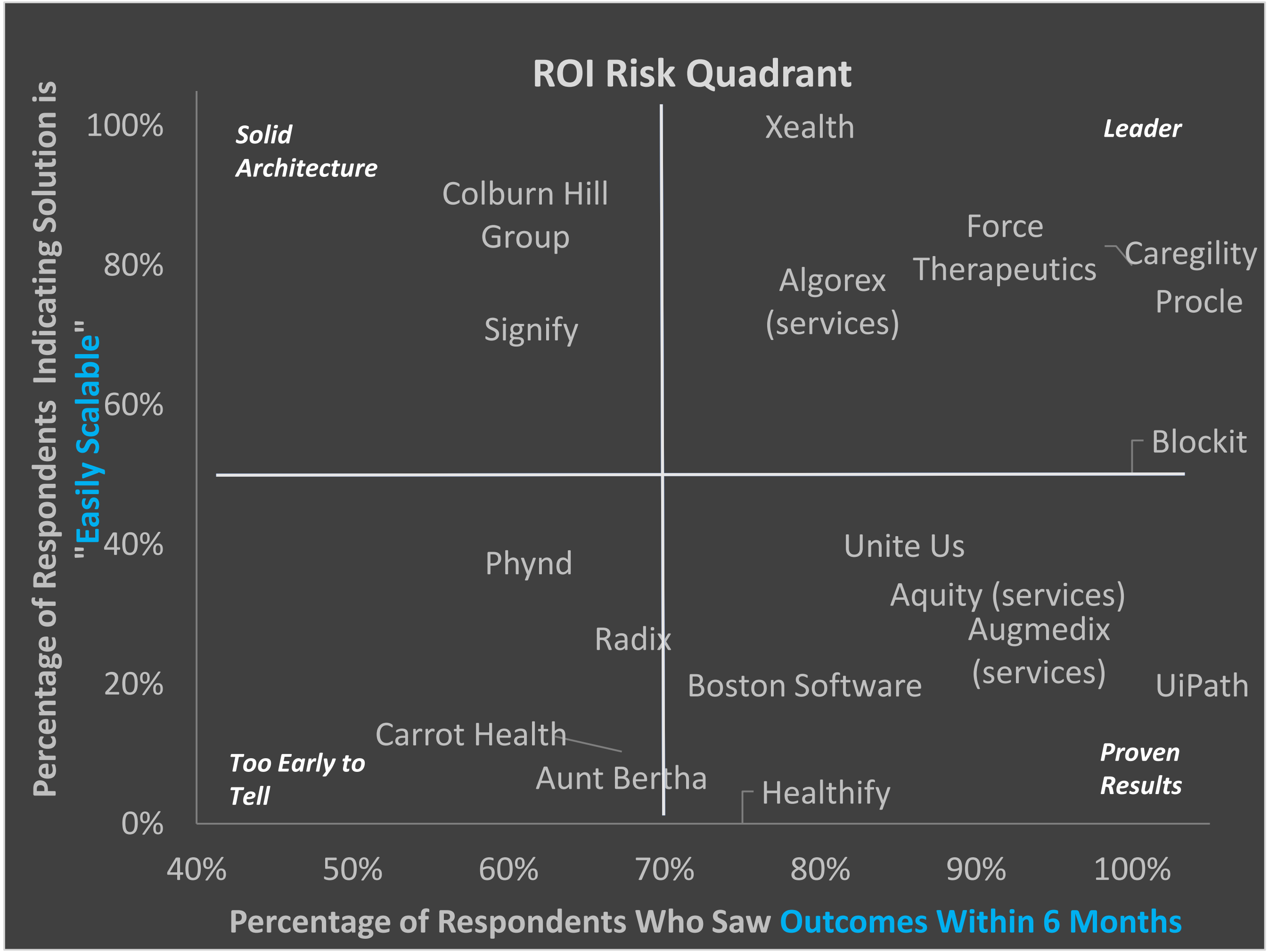
Telehealth / Virtual Care

- BRIGHT.MD
- caregility
- doximity
- Microsoft
- PROCLE HEALTHWORKS
- SOC Telemed
- zoom

KLAS® Emerging Product Quadrant Comparisons

Legend:
Leader: Sustainable Outcomes
Proven Results: Expected Outcomes
Solid Architecture: Targeted Outcomes
Too Early to Tell: Inconsistent Outcomes

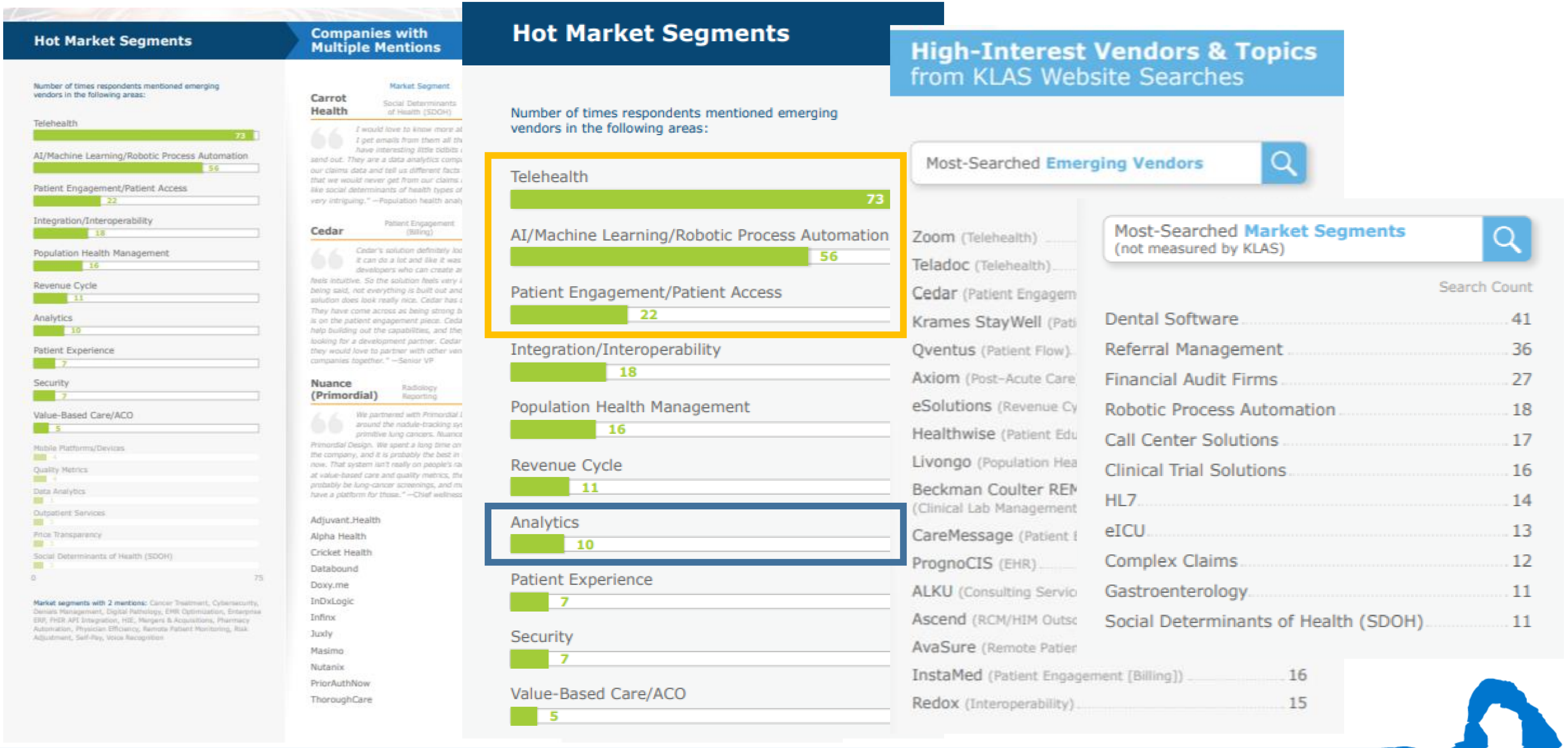
Company	Respondents
Algorex (services)	8
Aquity (services)	12
Augmedix (services)	8
Aunt Bertha	8
Blockit	4
Boston Software	10
Caregility	5
Carrot Health	8
Colburn Hill Group	6
Force Therapeutics	5
Healthify	4
Phynd	8
Procle	4
Radix	9
Signify	7
UiPath	10
Unite Us	10
Xealth	4



Other Comparisons:
- **Capability** - Scalability vs Functionality
- **Optimization** – Speed to Outcomes vs Implementation Quality
- **Interoperability** – Speed to Outcomes vs Effective Integration

KLAS® Emerging Technology Digest – February 2020

KLAS® Emerging Technology Digest – August 2020



The Next Big Innovation?

KLAS® Data From UPMC Center for Connected Medicine

What Is Top of Mind in Digital Health?

The Top of Mind for Top Health Systems 2021 (Top of Mind) research explores health systems' strategies, challenges, and priorities for the most impactful health technology areas, now and in the year ahead. Conducted in 2020, the research project was ideally positioned to explore not only digital health priorities but also how the COVID-19 pandemic was altering health systems' innovation plans. Early in the year, the Center for Connected Medicine (CCM)—in consultation with KLAS Research and CCM partners—chose to focus the research on areas where health system technology leaders were seeing the most progress, the most excitement, and the greatest need for innovation:

Full report is available at https://connectedmed.com/resources/top-of-mind-2020-data-analytics-precision-medicine-patient-engagement/

What is Top of Mind?

In what area of existing technology have you seen the greatest progress/improvement?

What do you see as the most exciting emerging technology in the next two years?

What area in health care has the greatest need for innovation/disruption?

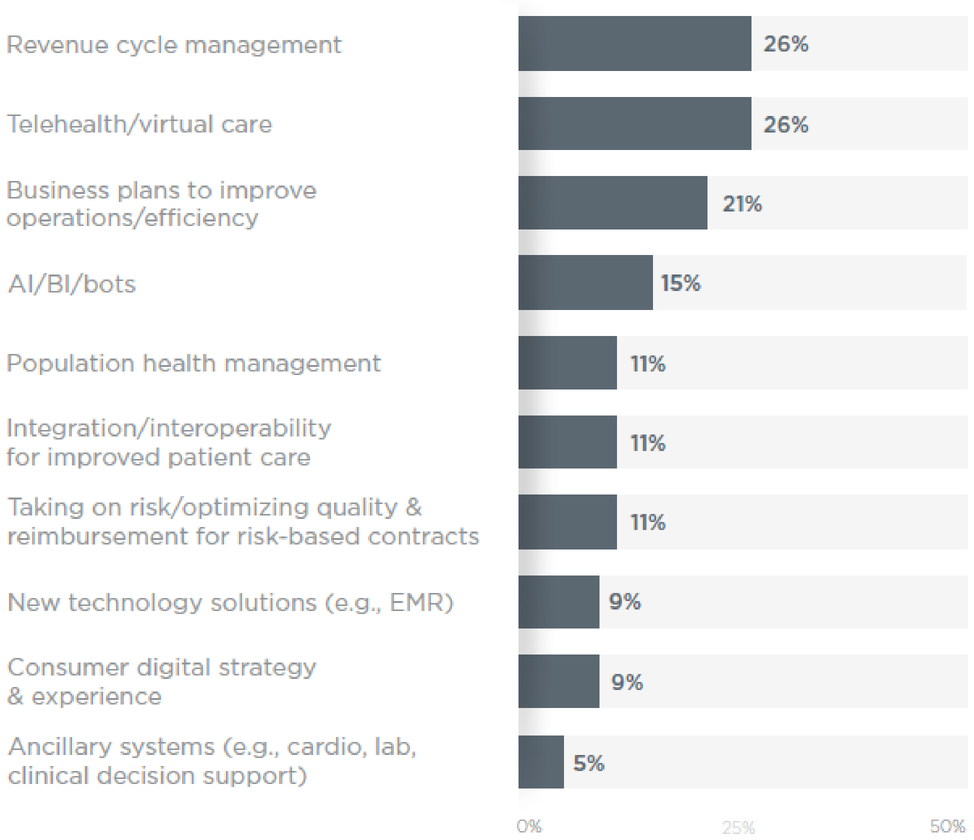
Top Answer
Telehealth
Artificial Intelligence
Revenue Cycle Management

Picking up energy after this research last year, **KLAS is seeing a dramatic rise in the focus health systems are putting on patient engagement and their digital front door.**

Innovation Priorities

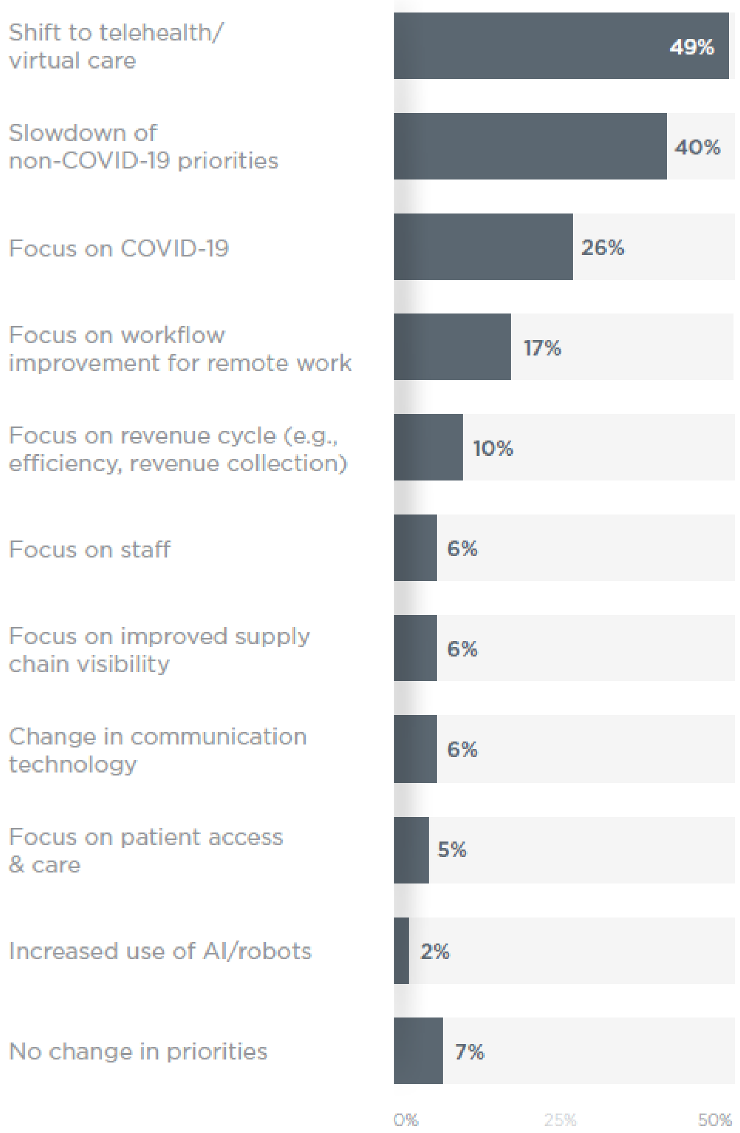
Top Innovation Priorities Prior to COVID-19

(100-percent scale) (n=94)

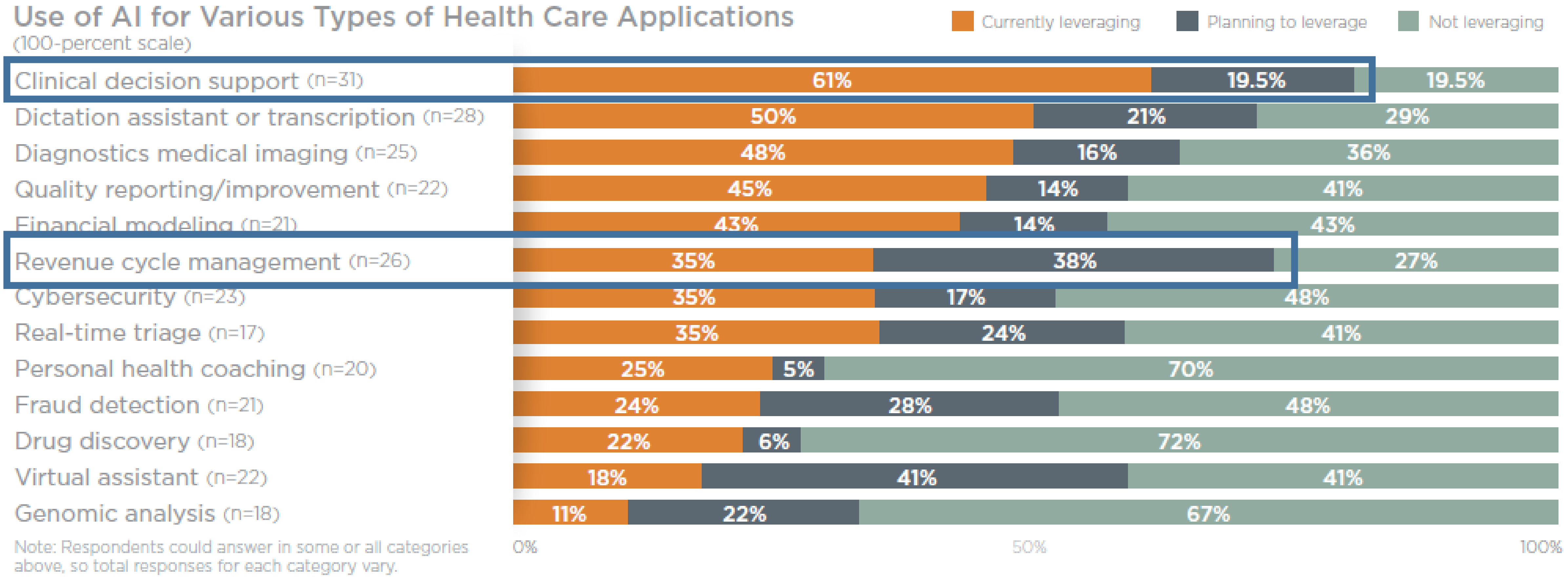


Effects of COVID-19 on Innovation Priorities

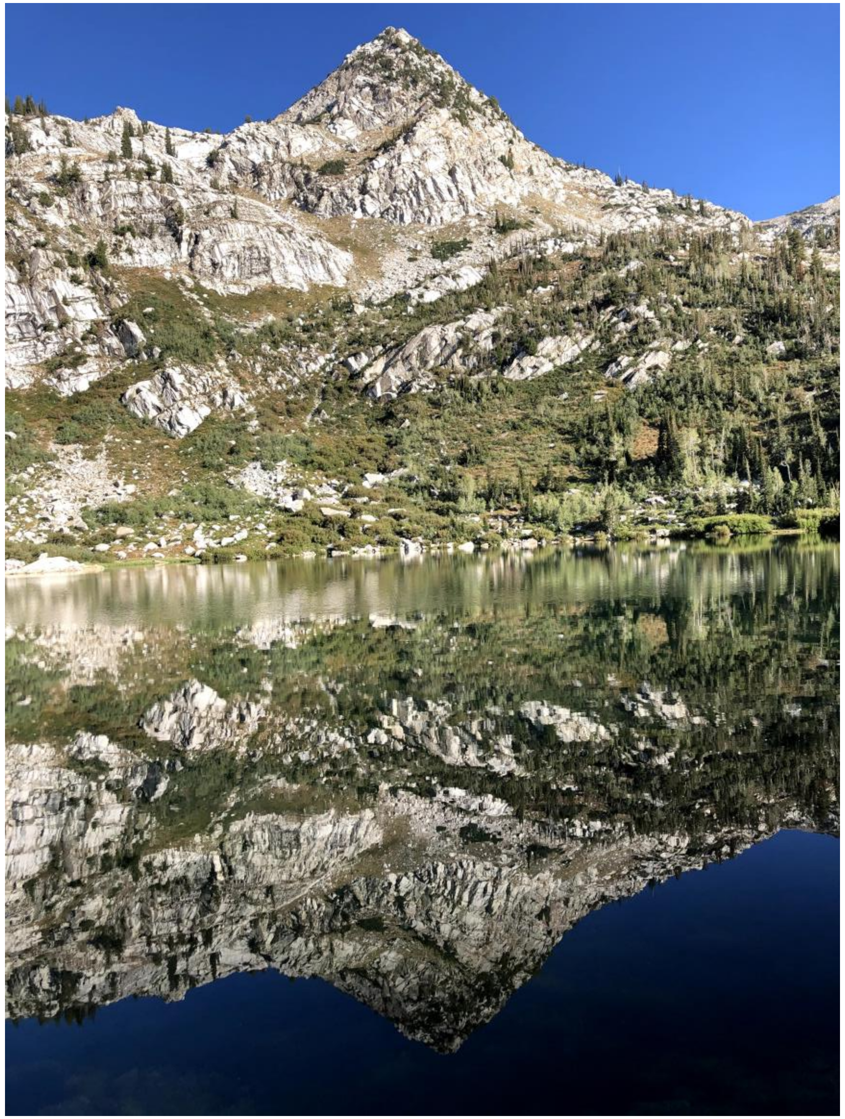
(100-percent scale) (n=86)



AI Adoption Uses



KLAS® Can the Big Three Get in and Stay?



KLAS Amazon (AWS) Summary

Greatest Opportunity with Amazon is that they **seem more willing than Google or Microsoft to adapt to what customers need**. Experience in supply chain and long-standing strength in healthcare are differentiators. Amazon is also ahead with real patient engagement solutions.

Early Mover Position in **hosting has helped Amazon move ahead** of Microsoft and Google.

Reporting Outcomes: Multiple customers reporting that working with Amazon **has driven cost reduction or time savings**. Some genomics projects were made 'possible' because of Amazon.

Seen as a possible competitor by some health systems after moves to directly deliver care.

Lack of Dedicated Healthcare Focus is a major drawback. **Healthcare delivery is split between AWS and Amazon corporate**, which almost act like two different companies.

- *Initially, Amazon Web Services was the only game in town. For people who want to take advantage of all of the benefits of cloud computing, elasticity, scalability, redundancy, and other things, it makes the most sense to go with Amazon Web Services.* [CTO]
- *I can throw any problem at the vendor, and they can think innovatively and come up with solutions. I sometimes come up with off-the-wall ideas, and when I talk to the AWS folks about those, they execute my ideas. I have not found another partner who can be as strategic and innovative as the AWS folks can.*[CIO]
- *Amazon Web Services is not perfect. I think we passed the honeymoon phase, and we are now discovering bugs and issues. Amazon Web Services is so big, so it feels like they don't need us compared to another vendor that is knocking on the door every day because they are moving behind in the race and are really pushing to have use cases on their platform. When we ask Amazon Web Services for help, they have a huge backlog. They are not always available.*[CTO]

KLAS® Amazon Product Mix

- **AWS Partnered Hosting**: Cerner is of course the largest name, but other such as Keystone Technologies host other clients. Most clients using hosting in hybrid and do not recommend to others to move existing systems to the cloud.
- **AWS Direct Hosting**: At least 15 direct customers.
- **Sagemaker**: Amazon **AI solution**. We know of 6-8 customers. Guessing Amazon has ~15 total.
- **Amazon Pinpoint/Connect**: **Patient communications, marketing and engagement platform**. Of 11 leading Amazon customers, 6 were adopting these tools. Said they were very easy to turn on.
- **Transcribe Medical**: **Ambient speech product** with an aim of competing with Microsoft/Nuance.
- **Transcribed Medical** is a **transcription service with some coding** built it. Very limited adoption.
- **HealthLake/RedShift/S3: Data warehouse** with AI and search capabilities. Still almost completely unproven. Several tools that could help here.
- **Amazon Chime**: **Virtual conferencing platform**. Almost no traction so far.
- **Textract: Machine learning** solution converting text/fax to digital. Limited adoption.

- *Amazon seems to have decent tools, but I have not experimented with Amazon SageMaker yet. So I will reserve judgement.* ***But the Amazon SageMaker base didn't seem to get at all the content that we need to get at. We need to do more than just create an application by plugging in different services.*** *That is not really our mandate. Our mandate is to create scores and to understand the business problem. Amazon SageMaker is just not really made for those processes.* [Lead Data Scientist]
- *Some of the consumer-facing tools that we can build on AWS that are the most important to us are Amazon HealthLake, Amazon Pinpoint, Amazon SageMaker, some of Amazon's other machine-learning tools, the native SMS email engines, the chat functions, and the interface for the mobile app. We have developed those things in React Native, and it has seemed to work well to use AWS as a back end. The primary tools are Amazon Pinpoint and the data lake, and Amazon's function plans have been very helpful for us. Amazon also has a nice API gateway that we have adopted. AWS has a menu of many other things, such as Alexa.* ***We can use the functionality in our call center or for appointment reminders. We have a completely HIPAA-compliant infrastructure. For us, it is easy to add features and functions as we are going, and we don't have to think about buying a third-party tool to plug in.*** [CIO]

Microsoft Summary

Greatest Opportunity with Microsoft is that they are **already in every health system in the country**. Integration of new healthcare-specific tools just make sense.

Nuance Acquisition is obviously a **major inroad to healthcare** data and insights.

Dedicated Healthcare Team is working to **translate much of Microsoft's current tools to use in healthcare**. Building tools for FHIR, DICOM, and packaged healthcare tools.

Playing Hosting Catch Up: Unlike AWS, Microsoft is **not doing much infrastructure hosting and management of third-party products in Azure**. Microsoft has a smaller portfolio of technology solutions than AWS for customers to tap into.

- The decision to choose Microsoft was really based on a cloud-governance perspective and who we wanted to have a deep partnership with. When we looked at the big players, Microsoft told us that the data and the platform were ours and that they would just provide us with the technical capability so that we could build stories on top of it. That was why we picked Microsoft over other vendors.
- Microsoft's licensing model is extremely complex. It would be nice if the model were simplified. We have an enterprise license agreement that we renew every few years. I would like to see more ramp-up time and more flexibility from Microsoft so that we don't have to commit to everything up front before getting an ROI. [IT Manager]

KLAS® Microsoft Product Mix

- **Hosting:** Later than Amazon but is **quickly gaining hosting energy**.
- **Teams** is being adapted for healthcare both as a **team communication device and as a telehealth solution**. Integrated with several EHRs including Epic, Chipsoft, Intersystems. Score of 84.1 (n=18).
- **Power BI:** Score of 87.7 (n=19) in KLAS. **Industry-leading functionality** and okay support.
- **Microsoft Identity Manager:** **Identity and access manager** that is currently underwhelming customers that invest into it. Weak technology.
- **Coming Nuance Tools:** While Nuance has a significant presence in healthcare, **ambient speech is the prize most assume Microsoft is looking for** in healthcare.
- **ERP:** A weakly adopted, "coddled together assortment of different providers from different places" (customer quote).
- **CRM:** **Limited adoption tool** that we are hearing about in sales deals.

- *We are all in on Microsoft. Teams is already the lifeblood of our communication within our health system, and the technology works really well for us. The ability to expand the Microsoft system to patient care is more efficient than using another system. Microsoft was late to the game with telemedicine capabilities, and they aren't as complete as we need them to be right now. But as soon as those functionalities are more robust, we will fully leverage them for our telemedicine visits. We never had any worries about HIPAA compliance because when the vendor was developing the product, they assured us that it was HIPAA compliant from the outset so that it could be utilized in healthcare.* [CMIO]

- *We are moving to Power BI, and the choice was simple. Microsoft is putting a lot of R&D into the product, and it shows. We are amazed by how easy Power BI is to use. The graphical interfaces are nicely put together, and people can simply consume information. Power BI is our future moving forward. Our main vendor is even building all their solutions on Power BI moving forward. The integrated platform with Azure AI is very compelling. We have looked at a bunch of solutions. Azure is going to become our data repository, and we know that the relationship between Power BI and Azure is pretty strong.* [VP of BI]

KLAS® Google Summary

Greatest Opportunity with Google is that they are **hungry to get into healthcare and are willing to spend for market share**. Also quick to do a moonshot innovation.

Hiring Run: On a hiring run and are **dropping prices for hosting**—often coming in lower than others.

Key Partnerships with **Ascension and Mayo** has Microsoft working on searching through big data, selling patient data to pharma, **remote patient monitoring and other "big" concepts**. These partnerships are trying to boost Googles trust with the industry which is lower than that of Amazon or Microsoft.

Invested in Amwell: Google's recent investment into Amwell is a half-in jump into existing healthcare technology.

- *We are hoping that the Google investment with Amwell is going to make them a much better vendor. That is a big hope because Amwell hasn't been a great vendor for us. Amwell has come in with a much better approach over the last three or four months. We need to have a process going forward that is completely easy for the patients and offers no hurdles. We don't want any age groups to have better ease of use than other age groups.* [CMIO]
- *Google is much more affordable than other vendors, and we can pay as we go. There is just a little more agility for us from a pricing perspective. With other vendors, we are either paying for things up front and reserving instances or paying for high usage fees. Purchasing from Google was a large decision that involved a lot of people at our organization.* [Data Science Director]

KLAS® Google Product Mix

- **Hosting: Very limited** number of direct hosting customers.
- **Cloud AI and ML:** Still **limited but starting to be considered**.
- **Amwell:** Invested 100M+ into Awell.
- **Care Studio:** Search-centric portal into multiple EHRs. **No traction** that KLAS knows of.

- *Google has higher-level services. We don't have to worry about managing the underlining cloud infrastructure. Google has extracted a lot of underlining infrastructure components from their customer, especially in terms of data flow and ML capabilities. When we were looking at vendors, Google's infrastructure was attractive to us because we wanted our people to spend as much time as possible building future innovations and not managing storage services from another vendor. We also found that we could achieve significant cost savings in moving some of our workloads to the Google platform. So a few years ago, that was what we did. We found that it was much cheaper to go that route.* [CTO]
- *When we originally made the decision to move our infrastructure to the cloud, Google wasn't an option for us. More recently, we have started using them for AI and ML.* [VP, Software Design]
- *Google has definitely come a long way. They were one of the leading competitors. Google is catching up a lot in the analytics space. Google has some uniqueness.* [Manager, IT Operations]