



AWS in Healthcare 2022

A Deeper Look at Artificial Intelligence
and Machine Learning Capabilities



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Executive Insights

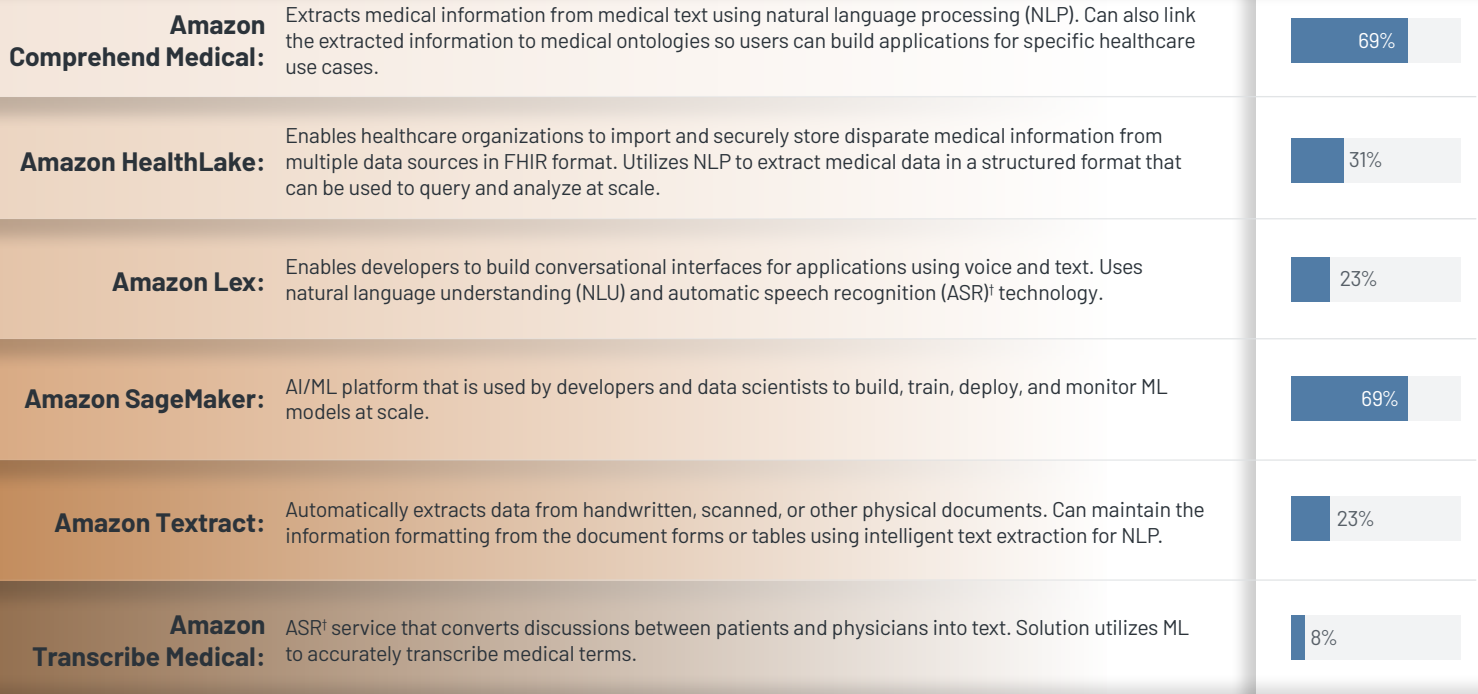
AWS in Healthcare 2022

A Deeper Look at Artificial Intelligence and Machine Learning Capabilities

Excited by the potential time and money savings, many healthcare organizations want a deeper understanding of what artificial intelligence (AI) and machine learning (ML) technology from public cloud providers could do for them. This research, a follow-up to KLAS' [2021 report](#) on Amazon Web Services (AWS), examines the experiences of 13 payer and provider organizations using AWS AI/ML offerings. This study is meant to help organizations considering AWS understand what technologies are being used, the overall customer experience, and the impact of these offerings. This report also shares AWS clients' insights into their selection process and their perceptions of Google Cloud Platform (GCP) and Microsoft Cloud (both of which will be the focus of future reports). To learn how KLAS defines AI and ML, see [this report](#).

Amazon Web Services HIPAA-Eligible AI/ML Offerings

% of respondents using offering (n=13)



† Advanced ASR technologies leverage natural language processing (NLP).

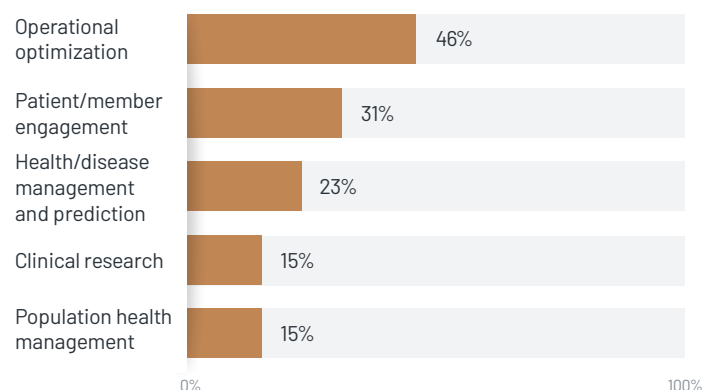
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Operational Optimization Most Widely Deployed Use Case; Forward-Looking Energy Focused on Clinical Impact

Across the healthcare industry, payers and provider organizations are increasingly turning to AI- and ML-enabled technologies to streamline and optimize processes. Common operational use cases adopted by provider organizations include incorporating consent forms in the EMR, improving patient flow in the OR by gathering needed PHI before surgery, converting unstructured patient notes into structured formats, accelerating access to needed PHI, and automatically documenting discussions between patients and physicians. Payers use AWS solutions to automatically extract and convert faxed information from physician offices for prior authorizations and to convert handwritten documents such as grievances, appeals, and member enrollment forms. Both groups are leveraging Amazon AI/ML tools like Comprehend Medical and SageMaker to better understand the consumer experience and to engage patients or members by connecting them to care guides. Other solutions, such as Lex, are used to proactively tackle care management by connecting high-risk cohorts with their doctors to ensure they get emotional support, reminders for care-gap closures, and even COVID-19 screenings.

Use Cases for AWS AI/ML

Percent of respondents using vendor for use case (n=13)



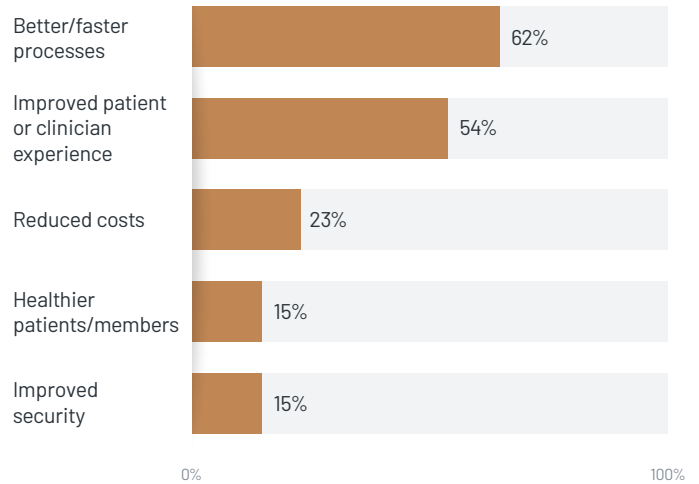
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Reduced Manual Processes & Time Savings Are Key Outcomes

Time savings are a core outcome identified by many respondents. Examples include reducing the time to extract and convert handwritten information from days to hours, reducing afterhours physician documentation, and less administrative time spent entering consent forms into the EMR. When it comes to the patient/member experience, both payers and providers say leveraging multiple AWS tools allows for greater continuity of care. These tools have streamlined access to care, helped members connect with healthcare staff that have helped them previously, and provided sentiment analysis of conversations to support real-time experience improvement. The organizations that report seeing process improvements use Comprehend Medical, Lex, SageMaker, Textract, and Transcribe Medical, in addition to other infrastructure and platform services. Organizations that have seen improvements in the patient experience note the use of Comprehend Medical, HealthLake, Lex, SageMaker, and Textract.

Outcomes Achieved with AWS AI/ML

Percent of respondents reporting outcome (n=13)



Beyond Technology, Strong Service & Support Drive Perceptions of AWS as a Partner

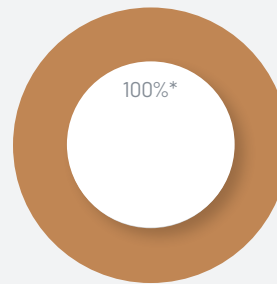
Customers consistently describe AWS as a proactive, reliable partner who is committed to client success. Respondents appreciate the vendor's willingness to meet with all members of an organization's team, not just high-level decision-makers, to help them understand how to be successful. Ongoing support personnel are accessible, deeply know the customer's solutions, and encourage regular communication and touch points. Several respondents say that their success with the tools has come directly as a result of the focus and attention they receive from AWS. These positive experiences drive a high level of customer loyalty. Most respondents are excited to see what else AWS can offer in the future and would recommend AWS AI/ML capabilities to their peers.

Customer Loyalty to AWS

*Limited data

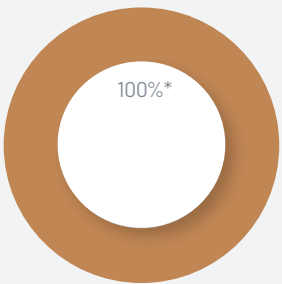
Would you buy again? (n=13)

Yes No



Part of long-term plans? (n=13)

Yes No

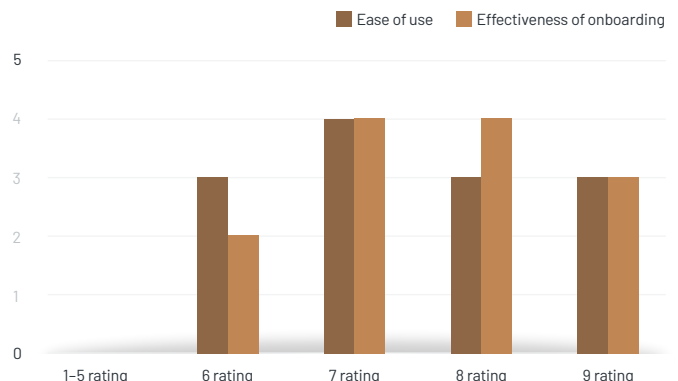


To Support Usability, Customers Encourage AWS to Make Training a Stronger Focus

When organizations have a positive experience with onboarding, they report better ease of use and describe the platform as intuitive; in contrast, weaker training and onboarding is tied to lower ease-of-use ratings. In general, customers encourage potential clients to purchase time with AWS' tech team to develop the internal technical expertise necessary to be successful. Organizations who have received this training say it is useful but is not well advertised to clients as an option. AWS could improve client success by better communicating that this training is available and important, along with ensuring their training specialists have a strong understanding of various healthcare audiences.

Onboarding and Ease of Use Ratings Distribution

(1-9 scale) (n=12)



AWS Customers' View of the Market: Microsoft Cloud a Viable Competitor, Less Enthusiasm for Google Cloud Platform

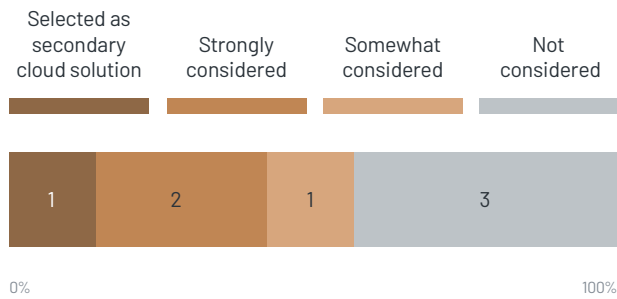
For this study, KLAS asked AWS customers about their platform-selection process and considerations. Many say they selected AWS because it was the most mature platform at the time. Other common reasons for selection are name recognition, Amazon's reputation for creating strong and highly integrated consumer-facing applications, high system reliability and performance, and strong security and privacy.

These AWS customers also shared their perceptions of and experiences with Google Cloud Platform (GCP) and Microsoft Cloud during the selection process. Upcoming KLAS reports will share feedback from Google and Microsoft customers, in addition to these organizations' perceptions of AWS.

Google Cloud Platform

It is not uncommon for AWS clients to use Google as a secondary vendor for analytics and AI/ML. 57% of interviewed AWS clients also considered GCP. While several felt Google has strong analytics and is making progress, these AWS customers highlighted concerns that led them to partner with AWS over Google. One said GCP wasn't comprehensive enough to meet their needs. Others expressed concern that Google isn't focused enough on healthcare. Other concerns include that Google was too rigid and needed more healthcare expertise. 43% of interviewed AWS clients did not consider GCP.

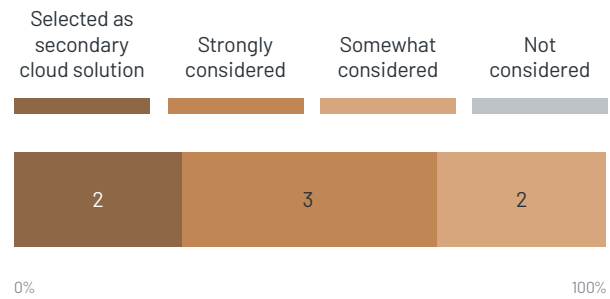
Consideration of Google Cloud Platform



Microsoft Cloud

All AWS customers who detailed their purchase decision process either considered Microsoft Cloud or selected it as a secondary solution. A couple of respondents began with the intention of using Microsoft Cloud as their primary cloud solution but encountered issues that caused them to pivot to AWS. One organization said Microsoft's platform seemed less developer friendly than AWS, and another had concerns about system performance. One midsize health system that very seriously considered Microsoft ultimately did not choose them because they felt the vendor's technology wasn't as fast, the various solutions were too siloed, and the licensing was too confusing.

Consideration of Microsoft Cloud



Report Information

About This Report

Each year, KLAS interviews thousands of healthcare professionals about the IT solutions and services their organizations use. As cloud offerings cover both software and services, this report draws on a hybrid set of quantitative evaluation questions from KLAS **standard software and services evaluations**, which are composed of numeric ratings questions and yes/no questions. KLAS also created a **supplemental evaluation** to delve deeper into several questions specific to AWS AI/ML offerings.

Healthcare organizations interviewed for this report come from an AWS-provided list of “leading customers”; as a result, this research is meant to convey insights on only a subset of the healthcare cloud market and is not representative of the market or the AWS customer base as a whole. The number of unique responding organizations is given in the chart below.

Sample Sizes

Unless otherwise noted, sample sizes displayed throughout this report (e.g., n=16) represent the total number of *unique customer organizations* interviewed. However, it should be noted that to allow for the representation of differing perspectives within any one customer organization, samples may include surveys from different individuals at the same organization. The table below shows the total number of unique organizations interviewed as well as the total number of individual respondents.

Some respondents choose not to answer particular questions, meaning the sample size can change from question to question. When the number of *unique organization* responses for a particular question is less than 15, the score for that question is marked with an asterisk (*) or otherwise designated as “limited data.” If the sample size is less than 6, no score is shown. Note that when a vendor has a low number of reporting sites, the possibility exists for KLAS scores to change significantly as new surveys are collected.

	Standard Evaluations		Supplemental Evaluations		Estimated Total Direct Customer Base (Providers and Payers Only)
	# of unique organizations	# of individual respondents	# of unique organizations	# of individual respondents	# of unique organizations
Amazon Web Services (AWS)	13	13	13	13	25-30

Note: This report focuses on provider and payer organizations who are direct AWS customers. AWS has thousands of indirect payer and provider customers who use AWS through 100+ independent software vendor (ISV) partners.

Reader Responsibility

KLAS data and reports are a compilation of research gathered from websites, healthcare industry reports, interviews with healthcare, payer, and employer organization executives and managers, and interviews with vendor and consultant organizations. Data gathered from these sources includes strong opinions (which should not be interpreted as actual facts) reflecting the emotion of exceptional success and, at times, failure. The information is intended solely as a catalyst for a more meaningful and effective investigation on your organization's part and is not intended, nor should it be used, to replace your organization's due diligence.

KLAS data and reports represent the combined candid opinions of actual people from healthcare, payer, and employer organizations regarding how their vendors, products, and/or services perform against their organization's objectives and expectations. The findings presented are not meant to be conclusive data for an entire client base. Significant variables—including a respondent's role within their organization as well as the organization's type (rural, teaching, specialty, etc.), size, objectives, depth/breadth of software use, software version, and system infrastructure/network—impact opinions and preclude an exact apples-to-apples comparison or a finely tuned statistical analysis.

KLAS makes significant effort to identify all organizations within a vendor's customer base so that KLAS scores are based on a representative random sample. However, since not all vendors share complete customer lists and some customers decline to participate, KLAS cannot claim a random representative sample for each solution. Therefore, while KLAS scores should be interpreted as KLAS's best effort to quantify the customer experience for each solution measured, they may contain both quantifiable and unidentifiable variation.

We encourage our clients, friends, and partners using KLAS research data to take into account these variables as they include KLAS data with their own due diligence. For frequently asked questions about KLAS methodology, please refer to [klasresearch.com/faq](https://www.klasresearch.com/faq).

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Note

Performance scores may change significantly when additional organizations are interviewed, especially when the existing sample size is limited, as in an emerging market with a small number of live clients.



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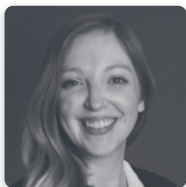


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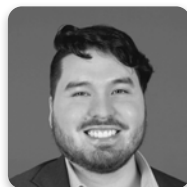
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Our Mission

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Expanded Insights

Introduction

The use of artificial intelligence (AI) technology is an important part of many payer and provider organizations' strategies as they work to improve outcomes, reduce costs, and improve the patient and clinician experiences. As part of this movement, many software vendors are including AI technology in their solutions either through their own AI development efforts, by embedding AI point solutions into their products, or by building their solutions on top of an AI or machine learning (ML) platform in the cloud.

Since KLAS' [2021 report](#) on Amazon Web Services (AWS), enthusiasm about public cloud providers has continued to grow. Excited by the potential time and money savings, many healthcare organizations want a deeper understanding of what AI and ML could do for them.

AWS provides three layers of cloud services: infrastructures services, platform services, and application services. Within application services, AWS offers technology that supports communication and AI/ML functions.

The focus of this research is the various AWS technologies specifically being used in the AI/ML realm. The following pages detail the experiences of 13 payer and provider organizations using AWS; the goal is to help other organizations considering AWS AI/ML understand what technologies are being used by current AWS customers, what the overall customer experience looks like, what impact is being seen, and how other public cloud providers are considered today. For details on how KLAS defines AI and ML, see this [report](#).

Figure 1

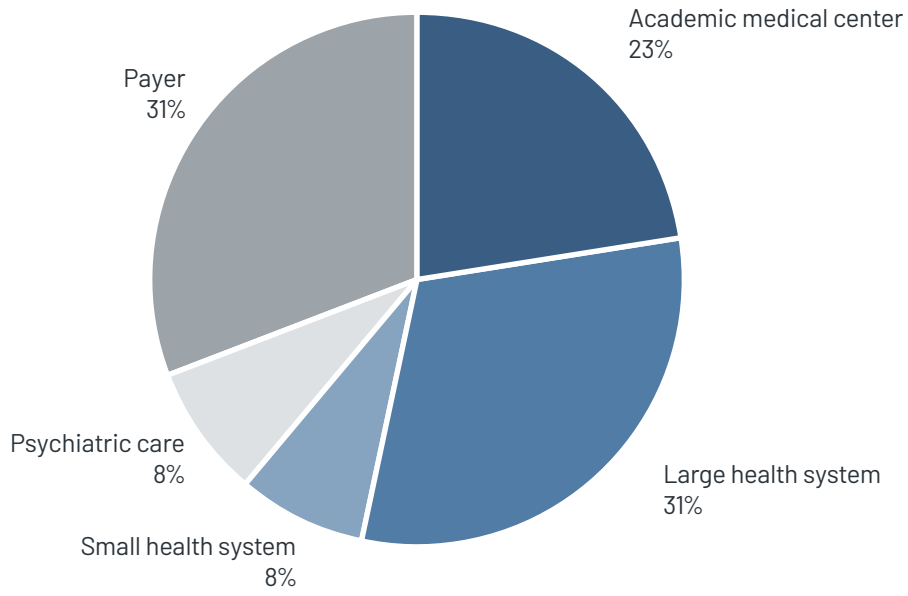
★ Focus of this report

Cloud Service Layers	Service/Technology Type	AWS Service/Technology Used by Customers
Infrastructure services (IaaS)	Compute, storage, load balancing, containers, etc.	S3, EC2, ELB, Batch, ECR, ECS, CloudFront, Route 53
Platform services (PaaS)	Serverless environment, databases, integration	Lambda, DynamoDB, Aurora, RDS, SQS, SNS, API Gateway, EventBus, Step Functions
	Data warehouse, data lakes, analysis tools (excludes AI/ML) Developer tools	Athena, EMR (Elastic MapReduce), Redshift, S3 (when used for data lake) CDK, CodeCommit, CodePipeline, Cloud9, CodeBuild, CodeDeploy, CloudFormation
Application services	★ AI/machine learning	SageMaker, Comprehend Medical, Lex, Textract, HealthLake, Transcribe Medical
	Communication tools	Connect, Pinpoint

Who Is Included in This Research?

For this study, KLAS spoke with 13 payer or provider organizations utilizing one or more of the AI/ML solutions listed above. The chart below shows additional demographic information about these customer organizations.

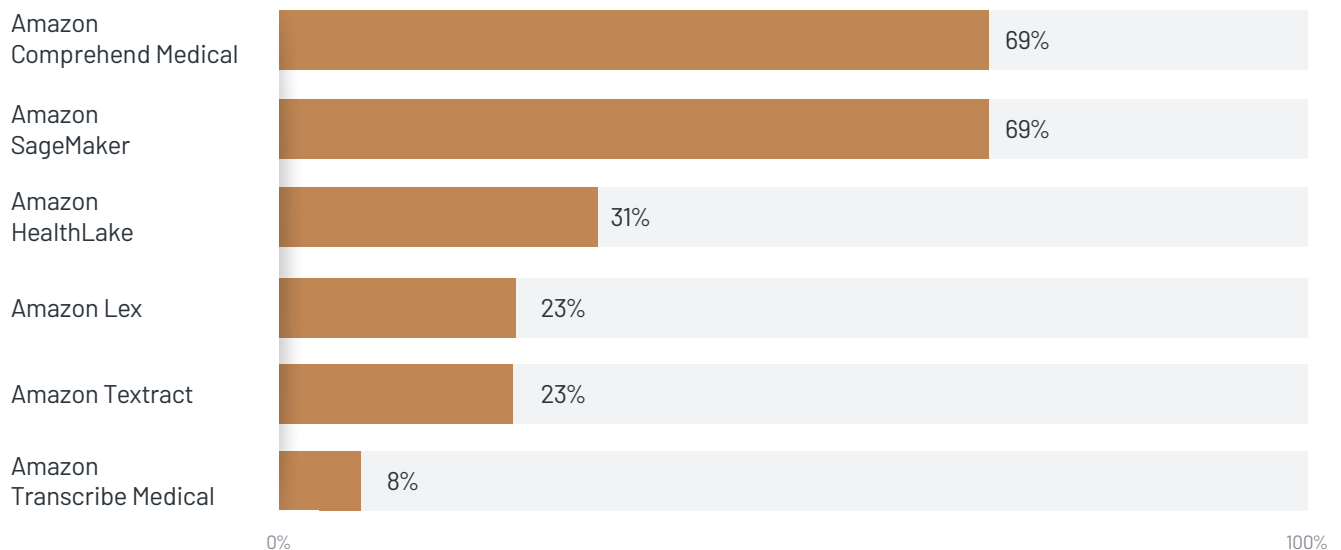
Figure 2 **Respondent Organization Type** (n=13)



Amazon AI/ML Technologies and Services: Adoption and Definitions

The AI/ML solutions most commonly used by interviewed AWS clients are Comprehend Medical and SageMaker, followed by HealthLake, Lex, and Textract. Use of Transcribe Medical is more limited, though this solution also has a positive impact on customer organizations.

Figure 3 **Amazon AI/ML Offerings in Use** Percentage of respondents using offering (n=13)



Comprehend Medical, which uses NLP to extract health data from medical text and then map it to the appropriate medical ontology, is the one of the most popular AI/ML technologies being utilized by the provider and payer organizations interviewed for this research. This solution helps healthcare organizations convert unstructured patient notes into a structured format that is more usable for coding and analysis, ultimately aiming to better support providers and their digital environments. Interviewed organizations report using Comprehend Medical for operational optimization, patient/member engagement, population health management, clinical research, and health and disease prediction initiatives.

SageMaker is an AI/ML platform used by developers and data scientists to build, train, deploy, and monitor ML models at scale. This solution is also widely used across the report sample; notably, several respondents are in very early stages with this solution. One payer organization uses SageMaker along with other analytics tools for member outreach. An interviewed academic medical center uses SageMaker and other tools to develop algorithms to extract imaging traits from medical imaging data and make predictions on unseen data. Another customer uses SageMaker to better understand what is happening in certain patient populations.

Textract, an ML technology, is used by all payer organizations in this report sample. Textract automatically extracts data from handwritten, scanned, or other physical documents and can maintain the information formatting in these documents (including tables). Common use cases among payers include converting faxed information from physicians' offices for prior authorizations and converting handwritten documents such as grievances, appeals, and member enrollment forms.

HealthLake, Lex, and Transcribe Medical are used by a handful of interviewed provider organizations. A couple of customers use HealthLake to ingest a variety of different healthcare data sources and data types to help standardize the data for population health management initiatives. Among other things, Lex is used to pull information out of the EMR and present it on monitors that surround patients in the operating room. Transcribe Medical is used to convert speech to text for discussions between patients and physicians.

How Is AWS Being Used, and What Outcomes Are Being Achieved?

Across the healthcare industry, payer and provider organizations are increasingly turning to AI- and ML-enabled technologies to streamline and optimize their processes. Common operational use cases being adopted by provider organizations include inserting consent forms into the EMR, improving OR patient flow by gathering needed PHI before surgery, converting unstructured patient notes into structured formats, accelerating access to needed PHI, and automatically documenting discussions between patients and physicians. Payers commonly use AWS solutions to automatically extract and convert faxed information from physician offices for prior authorizations and to convert handwritten grievances, appeals, member enrollment forms, and so on.

Both payer and provider organizations leverage tools like Comprehend Medical and SageMaker to better understand the consumer experience and to engage patients or members by connecting them to care guides. One payer organization reported using multiple Amazon solutions, including Lex, to proactively tackle care management by connecting high-risk patient cohorts with their doctors to ensure they get emotional support, reminders for care-gap closures, and even COVID-19 screenings.

Overall, time savings are a core outcome identified by many respondents. Examples of time-saving outcomes include reducing time to extract and convert handwritten information (from days to hours), reducing time spent on after-hours physician documentation, and reducing administrative time entering consent forms into the EMR. When it comes to improving the patient/member experience, both payers and provider organizations note that leveraging multiple AWS tools allows for greater continuity of care by streamlining access to care, connecting members with healthcare staff that have helped them previously, and providing sentiment analysis of conversations to provide real-time experience improvement. The organizations that report process improvements use Comprehend Medical, Lex, SageMaker, Textract, and Transcribe Medical in addition to other infrastructure and platform services. Organizations that have seen improvements in the patient experience use Comprehend Medical, HealthLake, Lex, SageMaker, and Textract.

Figure 4 **Use Cases for AWS AI/ML** Percent of respondents using vendor for use case (n=13)

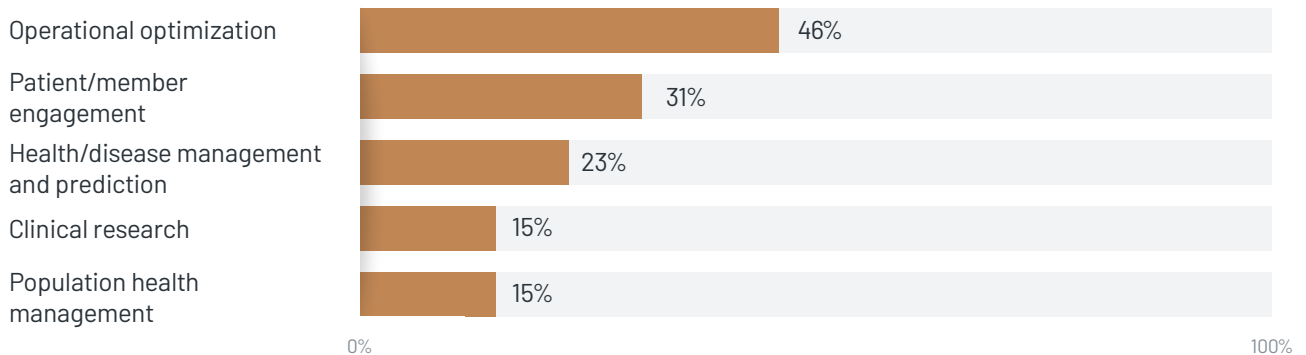
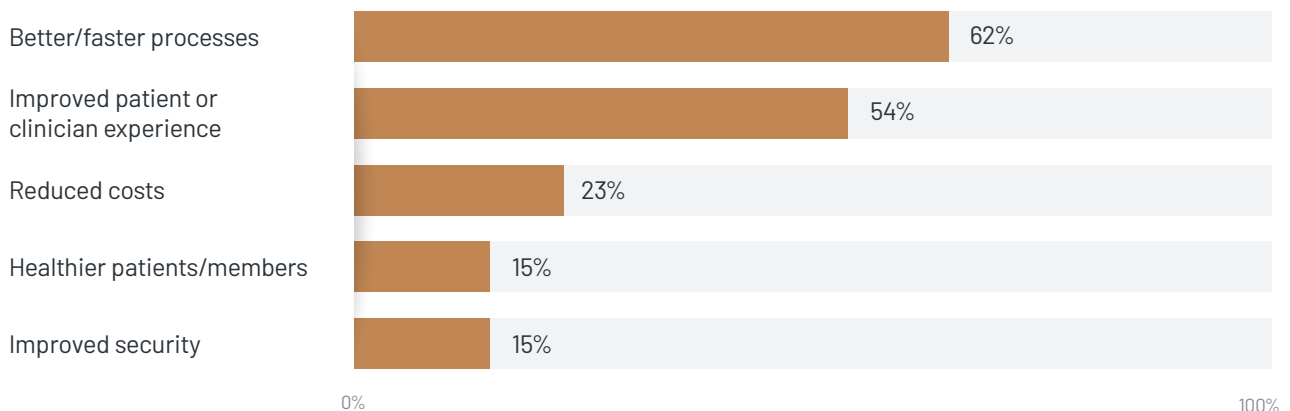


Figure 5 **Outcomes Achieved with AWS AI/ML** Percent of respondents reporting outcome (n=13)



The following sections detail customer feedback on each of the use cases above, in order of how frequently the use cases were mentioned by interviewed organizations.

Operational Optimization

One of the key reasons provider and payer organizations turn to AI/ML is to streamline processes and optimize operations—and they frequently achieve those results.

Interviewed payer organizations use Amazon’s AI/ML technology to automatically extract and convert faxed information from physician offices for prior authorizations and to convert handwritten documents to text. According to one VP at a payer organization, *“When we were processing things manually, it would take two or three days. Now that we have automated the process, we are able to consistently extract up to 90% of the data without any manual interruption. What used to take three days now takes one to two hours maximum.”*

Provider organizations use the solutions to insert consent forms into the appropriate patient record in the EMR, improve patient flow in the OR by ensuring all appropriate patient information is in the system prior to surgeries, convert unstructured patient notes to a structured format, access needed patient information more quickly, automatically capture and document patient/provider discussions, and enable clinicians in the operating room to use voice commands to pull information from the EMR and present it on screens in the room.

An administrative director for a large health system shared, *“Physicians who are leveraging this ambient speech technology in the moment are saving time. For example, there are some physicians who historically have had to document for three or four hours after business hours that are now having less after-hours work because the transcribed conversation means there is already a note created. The note isn’t always 100% accurate, but it at least gives physicians a better starting place than their hand-scribbled notes of what the conversation was, who said what, and the direction of that conversation. Having the transcription helps them clear out their in-baskets faster.”*

Figure 6 **Operational Optimization—AWS Adoption and Associated Outcomes**

<p>Number of respondents citing as a primary use case</p> <p>6</p>	AWS services in use	Associated outcomes achieved
	Comprehend Medical Lex SageMaker Textract Transcribe Medical	<ul style="list-style-type: none"> Reduced time required to extract and convert handwritten grievances, appeals, and member enrollment forms (from a few days to a couple of hours) Dramatically reduced the number of rescheduled procedures in the OR, saving time for patients, caregivers and administrative staff Physicians spending much less time documenting patient visits after hours as a result of transcription services
	Other infrastructure and platform services also often used	<ul style="list-style-type: none"> Automation and innovation built by payer enabled providers still using faxes to take advantage of that technology for prior authorization Fewer clicks required for nurse controllers in the OR, allowing for more attention focused on the patient during surgery Many hours saved for administrative staff by eliminating need to manually insert consent forms into the appropriate patient record within the EMR

Patient/Member Engagement

Multiple interviewed payer and provider organizations are leveraging AWS AI/ML solutions to better engage patients and members and improve their experience.

One payer organization used AWS development platform to create a SaaS product that leverages Comprehend Medical and SageMaker (among other tools) to connect healthcare consumers to care guides. Another payer customer is using multiple Amazon solutions to build better models around the customer experience. One other uses solutions such as Lex to reach out to members at high risk for health complications, helping them get connected to their doctor, receive emotional help if needed, and receive assistance in getting vaccinated.

The chief digital officer at a health system reported using AWS to provide reminders about appointments, COVID-19 screenings, and care-gap closures: *"[Our organization] is working to improve patients' digital experience through multiple initiatives. One includes creating an AWS-native identity platform that provides a login across the patient portal, mobile applications, and other solutions. Another initiative is providing reminders for COVID-19 screening, appointments, and care-gap closures. All of that is native to the AWS platform. We are also creating an AWS-native mobile application that integrates the electronic health record with the other digital patient experience solutions."*

Figure 7 **Patient/Member Engagement—AWS Adoption and Associated Outcomes**

Number of respondents citing as a primary use case	AWS services in use	Associated outcomes achieved
4	Comprehend Medical HealthLake Lex SageMaker Textract	<ul style="list-style-type: none"> • During COVID-19, enabled members to quickly connect with healthcare staff that had helped them previously • Ability to quickly connect with patients/members at high risk from COVID-19 to help them get vaccinated and receive support • Early signs of a more seamless, more efficient, and better organized experience for patients
	Multiple respondents also use development tools (part of platform services); some use storage/data lake services	

Health/Disease Management and Prediction

Just under one-quarter of interviewed AWS customers use the vendor's AI/ML solutions for advanced analytics around health and disease management.

One health system uses AWS to develop algorithms that will extract imaging traits from medical imaging data and make predictions on unseen data. Another healthcare organization is in the early stages of using Comprehend Medical to extract data from medical text regarding certain disease types and using analytics tools to analyze that data and write AI algorithms for advanced analytics. This organization is also planning to use AI to help with workflow automation.

Findings obtained through AWS solutions and services are also being used to achieve early health interventions and treatment. A payer organization said they *"started to recognize some of the patterns of social determinants of health relative to COVID-19. . . . We were able to put data sets together to support more targeted outreach and put our people in a better position to help."* Another payer uses SageMaker and other analytics tools to figure out member behaviors that result in unhealthy lifestyles and then do targeted outreach to help set members on a healthier path.

Figure 8 **Health/Disease Management and Prediction—AWS Adoption and Associated Outcomes**

Number of respondents citing as a primary use case	AWS services in use	Associated outcomes achieved
3	Comprehend Medical HealthLake Lex SageMaker Infrastructure and platform services also used	<ul style="list-style-type: none"> • Identified populations with lower likelihood of surviving COVID-19 and did targeted outreach to provide more support to these patients • Healthier members, lower costs, and better client retention • Discovered several new genes associated with predisposition to higher levels of liver fat

Clinical Research

A couple of interviewed health systems are using AWS to aggregate clinical data and then—through Comprehend Medical, SageMaker, and other AWS analytics solutions—analyze and act upon the findings. The use of AWS has also helped these organizations leverage data from other solutions in a secure way. According to the CTO of one large outpatient client, AWS *"created a data lake that houses Epic and non-Epic big data. This data lake will make it possible for us to build a data science lab in AWS and bring non-Epic big data into Epic's data warehouse, Epic Caboodle, so we can do analytics."*

Figure 9 **Clinical Research—AWS Adoption and Associated Outcomes**

Number of respondents citing as a primary use case	AWS services in use	Associated outcomes achieved
2	Comprehend Medical SageMaker Other AWS analytics tools also used	<ul style="list-style-type: none"> • Ability to get an overall view of all data in a secure environment, allowing that data to be more quickly analyzed and acted on

Population Health Management

Similar to how AWS is leveraged for clinical research, a couple of customers are using solutions such as Comprehend Medical and SageMaker (along with other AWS analytics solutions) to aggregate data and act on findings that impact their patient/member populations. Additionally, these provider organizations use AWS capabilities to standardize access to information with little manual intervention. One applications manager shared, *“For our current patient population, we have important patient goals data that sits in two different systems, but we couldn’t get access to it in a standardized way before AWS. The medical scientists here tried to match the data, but their tool sets were exempt, and they couldn’t do the analysis across all of our patients. They could do it across 10 patients but not across a wide spectrum of patients. Also, the process was very manual and time consuming.”*

Figure 10 **Population Health Management—AWS Adoption and Associated Outcomes**

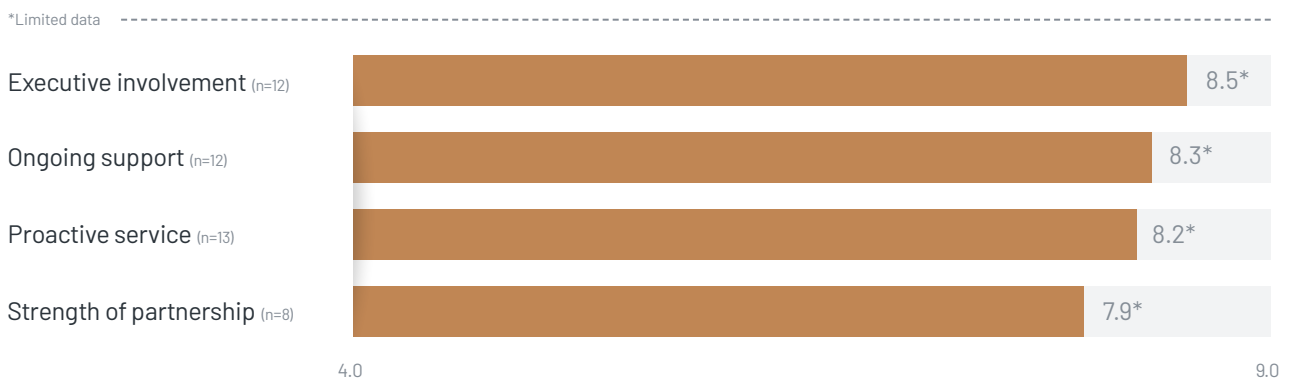
Number of respondents citing as a primary use case	AWS services in use	Associated outcomes achieved
2	Comprehend Medical HealthLake Lex SageMaker Other AWS analytics tools also used	<ul style="list-style-type: none"> • Improved data matching • Standardized data access • Ability to analyze across larger patient populations, driving improvements in health equity

Beyond Use Cases and Outcomes, What Is the AWS Customer Experience?

AWS Seen as a Partner Thanks to Strong Service, Support, and Outcomes

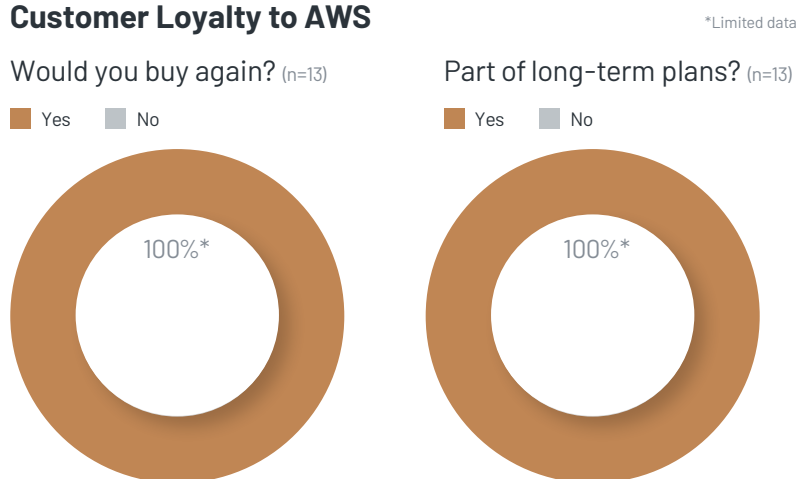
Interviewed customers consistently describe AWS as a proactive, reliable partner who is committed to client success. Respondents appreciate AWS' willingness to meet with all members of an organization's team, not just high-level decision-makers, to help them understand how to be successful. Ongoing support personnel are accessible, deeply know the solutions, and encourage regular communication and touch points. One senior manager explained, "AWS is honestly one of the only good support organizations left in IT in my opinion. All of the other ones are terrible. I have never had a bad experience with AWS support." Overall, customers feel AWS is trustworthy, invested in their organization, and highly communicative. And several respondents say their success with the solutions is directly attributable to the focus and attention they receive from AWS.

Figure 11 **Key Relationship Metrics** (1-9 scale)



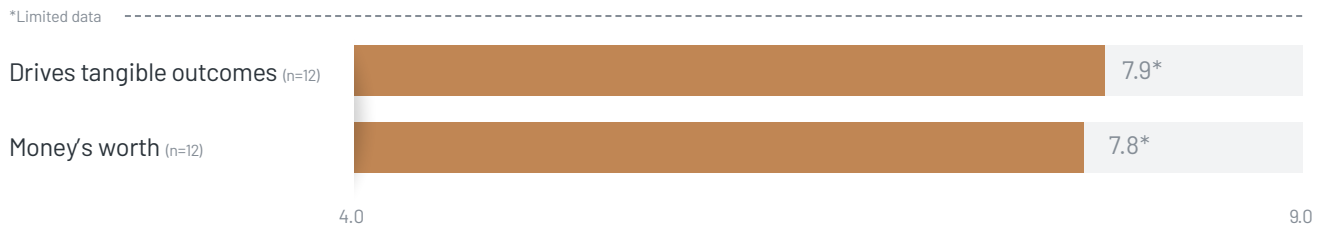
These positive experiences drive a high level of customer loyalty. Most respondents are excited to see what else AWS can offer in the future and would recommend AWS AI/ML capabilities to their peers.

Figure 12 **Customer Loyalty to AWS**



Another critical layer of the partnership relationship described by many customers is AWS' approach to cost. Customers say they only pay for what they use and that they get high value from what they do pay for. All respondents in this research say AWS avoids nickel-and-diming. A senior advisor stated, "Amazon is looking for long-term partnerships. They have treated us like a partner. Anytime I commit to buying something or doing something, they always give me credit back. They give me credits to hire outside consultants, and they will pay for it."

Figure 13 **Key Value Metrics** (1–9 scale)



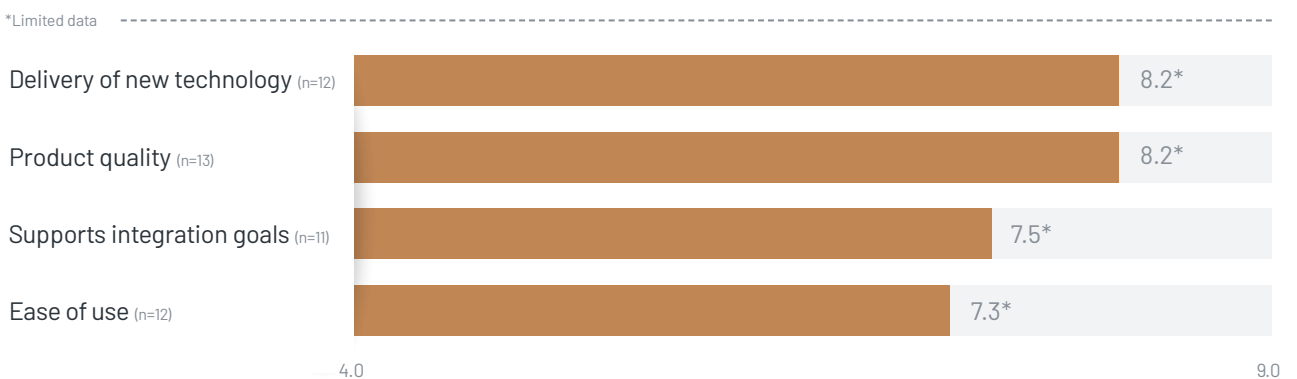
Customers Have Positive Perceptions of the Technology but Want Better Usability and Integration

Interviewed customers are quick to point out both the current quality of AWS solutions—including both technology and product expertise—and the fact that the platform is frequently being advanced. One director said, "Every day, I see something new on Amazon. They have quantum computers. I have done a little quantum work in that area, but not much. I know enough to know that that has a very limited scope right now. Quantum computing is still experimental."

Many customers are looking forward to future advancement and partnership with Amazon. Top areas they cited include:

- Workflow automation for physicians
- Faster/easier scheduling and bill-pay experiences for patients
- Better and easier access to information for care managers
- Streamlined process for research
- Faster/easier identification of fraudulent claims
- Better outcomes for underserved populations

Figure 14 **Key Product Metrics** (1–9 scale)



When it comes to areas for improvement, the top-mentioned opportunity is training to support usability. AWS applications are generally described as intuitive and easy to use, but organizations who describe weaker training or onboarding also rate the vendor lower for ease of use. Across the board, interviewed customers encourage potential buyers to purchase time with AWS' tech team to develop the internal expertise needed to be successful. Organizations who have received the training say it is useful but is not well advertised or clearly available to customers. AWS could improve client satisfaction by making training more prominent and by investing in their training specialists to ensure they understand various healthcare audiences. One CMO at a health system shared, *"The Amazon team thinks of Amazon Web Services as being super easy to use, but they have a different view of easy versus hard. The solutions are a little tricky if people don't know how to use them. I would tell people to buy time with Amazon's tech team as well as the solution. We will never develop the expertise needed in order to run the program well."* AWS has shared with KLAS that additional information on the training they offer can be found [here](#).

Another area for improvement is additional work around integration and true interoperability. One director explained, *"We have done everything we have needed to do with integration. I would like Amazon to put up an HL7 interface engine as a service. That is important in healthcare. They have a FHIR system that will search the output data, load it into a database, and process it, but that is not interoperability. Interoperability is what we have done in healthcare for 30 years with HL7 messages. It drives 95% of the messages. Amazon is leaving people out there to do their own thing, and that is a pain. The reason why they would not add that does not make sense to me. Interoperability is not an easy thing to do, and it is not Amazon's bread and butter. Maybe they are just a little reluctant after they saw all of the roadkill on the HIT highway. Having a cloud-based system in healthcare that must operate with other parts of the ecosystem will require different types of HL7, FHIR, and CDA components. That is a missed opportunity."*

How Do Current AWS Customers View the Market Landscape?

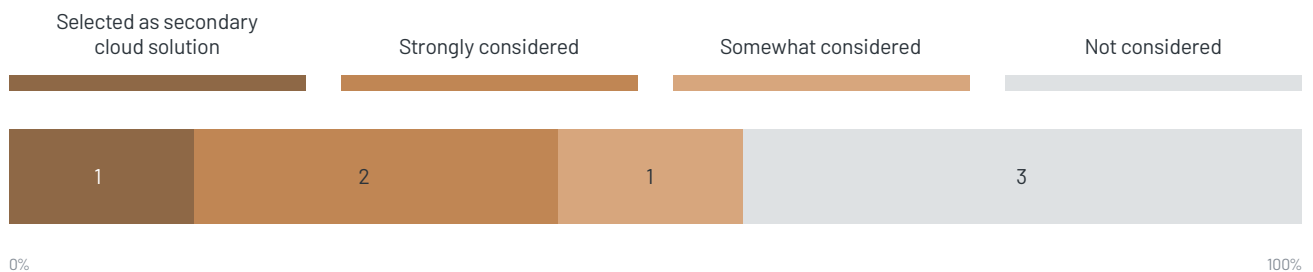
Interviewed AWS customers also shared insights into their selection process, including their perceptions of and experiences with Google Cloud Platform (GCP) and Microsoft Cloud. (Upcoming KLAS reports will share feedback from Google and Microsoft customers, in addition to their perceptions of AWS.)

Because AWS is a platform provider and has much broader capabilities than just AI/ML, many of the organizations KLAS spoke to were looking at the broader picture when they selected the vendor, and AI/ML use cases were one of multiple different types of use cases they had in mind for AWS.

Provider organizations selected AWS for a variety of reasons. Several indicated that AWS had the most mature platform at the time they selected it, and some went with AWS because of familiarity. One organization felt AWS was best suited for creating consumer-facing applications without having to buy and integrate separate products; they also liked the support and flexibility from AWS. Other purchase reasons include higher system reliability and performance, AWS feature set, the security model, and knowledgeable staff.

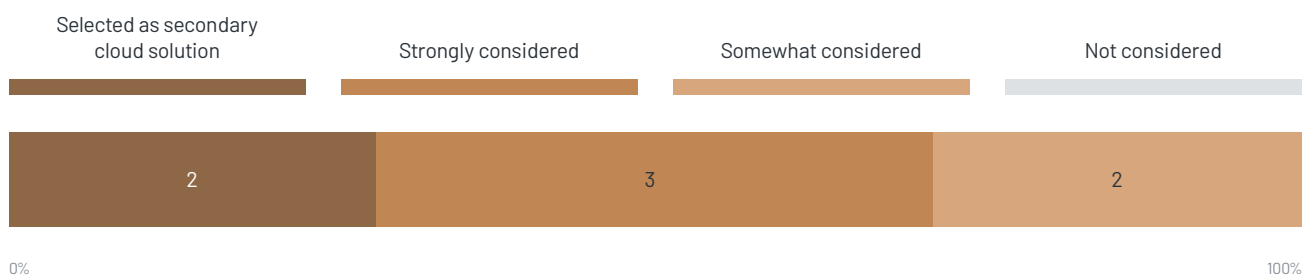
In previous research on the use of AWS in healthcare, multiple AWS clients reported using Google as a secondary vendor for analytics and AI/ML. 57% of interviewed AWS clients also considered GCP. While several feel Google has strong analytics and is making progress, these AWS customers had concerns that led them to partner with AWS over Google. One said GCP wasn't comprehensive enough to meet their needs. Others expressed concern that Google wasn't focused enough on healthcare, based on the fact that they recently dissolved their Google Health team. Other concerns include that Google was too rigid and needed more healthcare expertise. 43% of interviewed AWS clients did not consider Google.

Figure 15 **Consideration of Google Cloud Platform**



Interviewed organizations view Microsoft as a highly viable competitor. All AWS customers who detailed their purchase decision process either considered Microsoft Cloud or selected it as a secondary solution. A couple of respondents began with the intention of using Microsoft Cloud as their primary cloud solution but encountered issues that caused them to pivot to AWS. One organization said Microsoft's platform seemed less developer friendly than AWS, and another had concerns about system performance. One midsize health system that very seriously considered Microsoft ultimately did not choose them because they felt the vendor's technology wasn't as fast, the solutions were too siloed, and the licensing was too confusing.

Figure 16 **Consideration of Microsoft Cloud**



Conclusion

Current customers are excited about the possibilities of AWS, specifically given the outcomes they have begun to realize related to efficiency, experience, and patient health. AWS strong focus on customer service and partnership is a key differentiator for customers, and most see the cost as scalable and worth the value. Moving forward, customers want to see AWS tackle broader interoperability and workflow challenges, and they encourage both AWS and peer organizations to make training a foundational part of the AWS experience.