



AWS Machine Learning

A Business Perspective

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vILT
November 1, 2018



Module 1

Introduction to ML

Market Adoption

“ AI/ML Technologies Will Be in Almost Every New Software Product by 2020 – Gartner ”

“ By 2020, AI/ML will be a top five investment priority for more than 30 percent of CIOs – Gartner ”

“ The market for cognitive/AI solutions will experience a compound annual growth rate (CAGR) of 55.1 percent...to more than \$47 billion in 2020” – IDC ”

Potential Impact: Enterprise-wide



AI/ML use cases are gaining traction in ALL segments

Media and Entertainment



- Content Commissioning
- Content Creation
- Promotion and Marketing
- Copyright infringement
- Content Auto tagging
- Auto subtitling
- Rights negotiation

Healthcare and Life Sciences



- Patient health from clinical data
- Predicting hospital stay length and readmittance
- Drug discovery
- Radiology image recognition

Pricing and Product Recommendation



- Ecommerce
- Product recommendations
- Credit assessments
- Ad/Search relevance
- Personalization

Financial Services and Trading



- Portfolio management/robo-advising
- Algorithmic trading
- Sentiment/news analysis
- Geospatial image analysis
- Predictive grid computing capacity management

Customer Experience

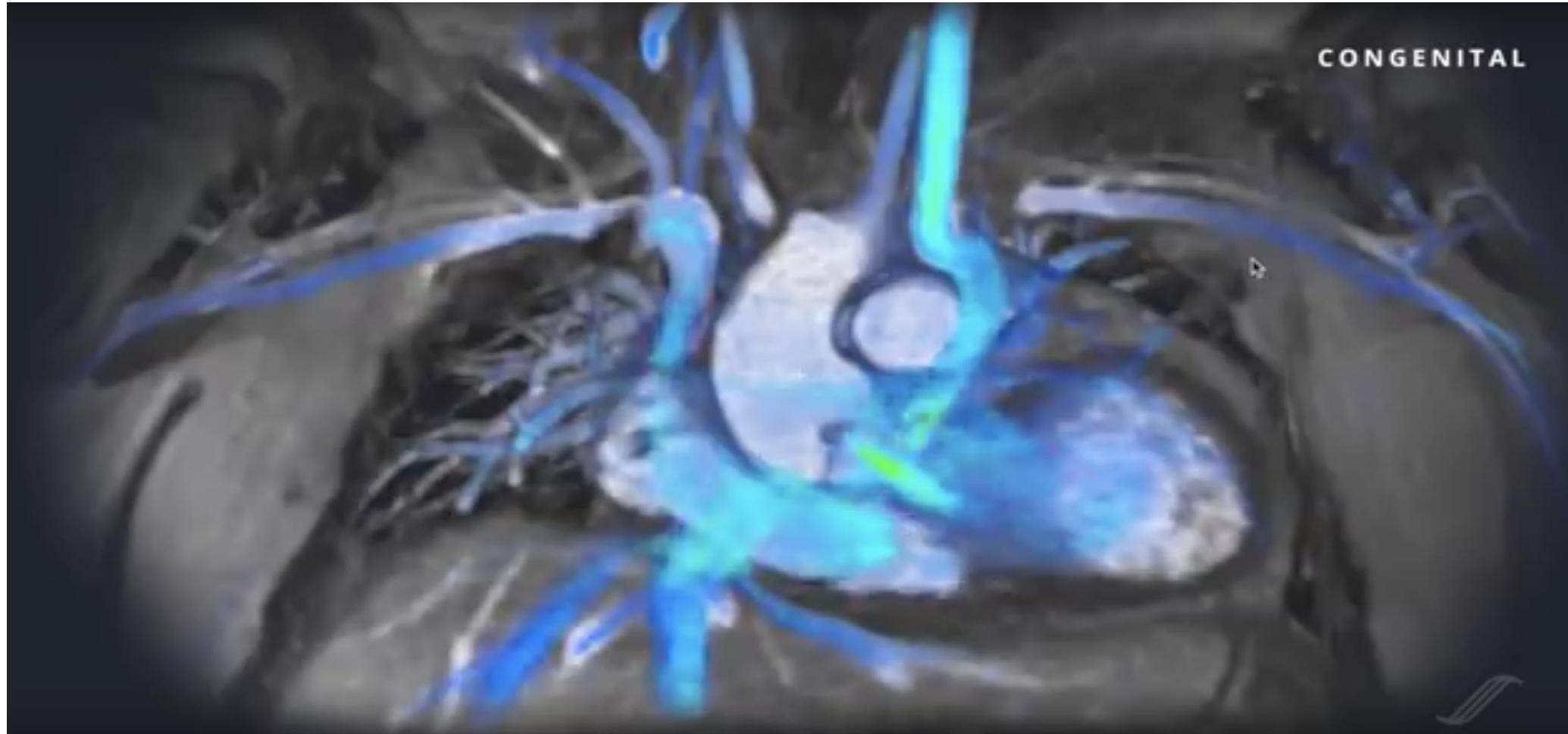


- Enhanced customer service through voice services and chatbots
- Call center optimization
- Personal financial management

FDA-Approved Medical Imaging



Using machine learning to diagnose patients for cardiovascular diseases



Autonomous Driving Systems



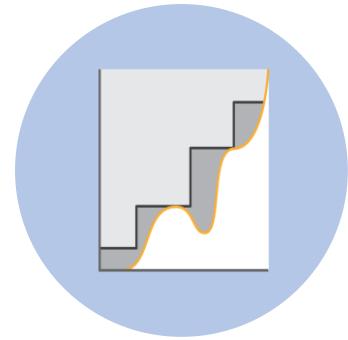
Using machine learning for object detection and per pixel object segmentation



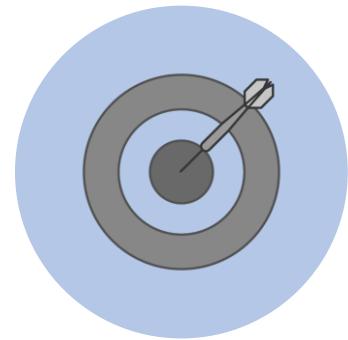
Machine Learning Solves Problems



Handle complex
correlations



Scale up
or automate



Product
Personalization



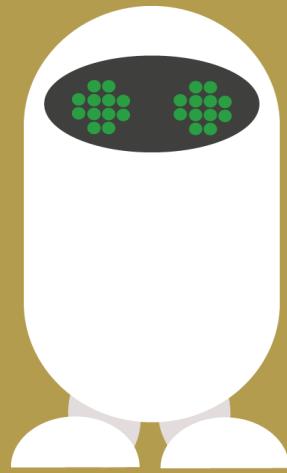
Infer in
real-time

The AI/ML Journey: What Is It?



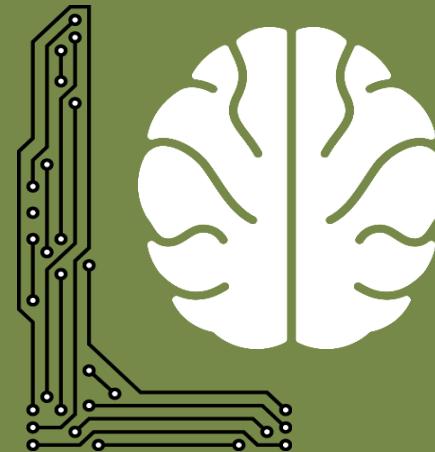
Artificial Intelligence

Any technique that enables computers to mimic human intelligence using logic, if-then statements and ML (including deep learning)



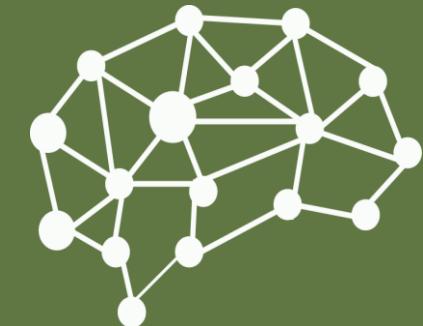
Machine Learning

Subset of AI that includes statistical techniques that enable machines to improve at tasks with experience (includes deep learning)



Deep Learning

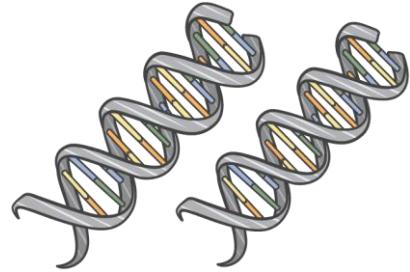
Subset of ML composed of algorithms that permits software to train itself to perform tasks like speech and image recognition by exposing neural networks to vast amounts of data



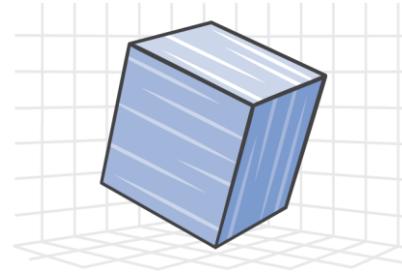
Deep Learning Breakthroughs

aws training and certification

Genome processing



Modeling and simulation



Speech recognition

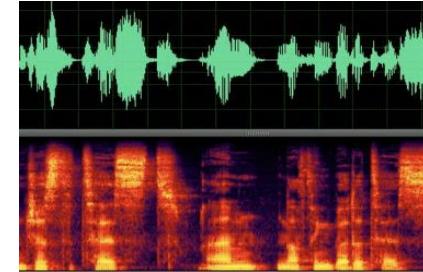


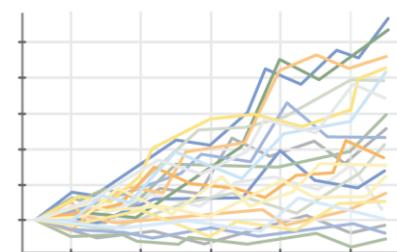
Image captioning



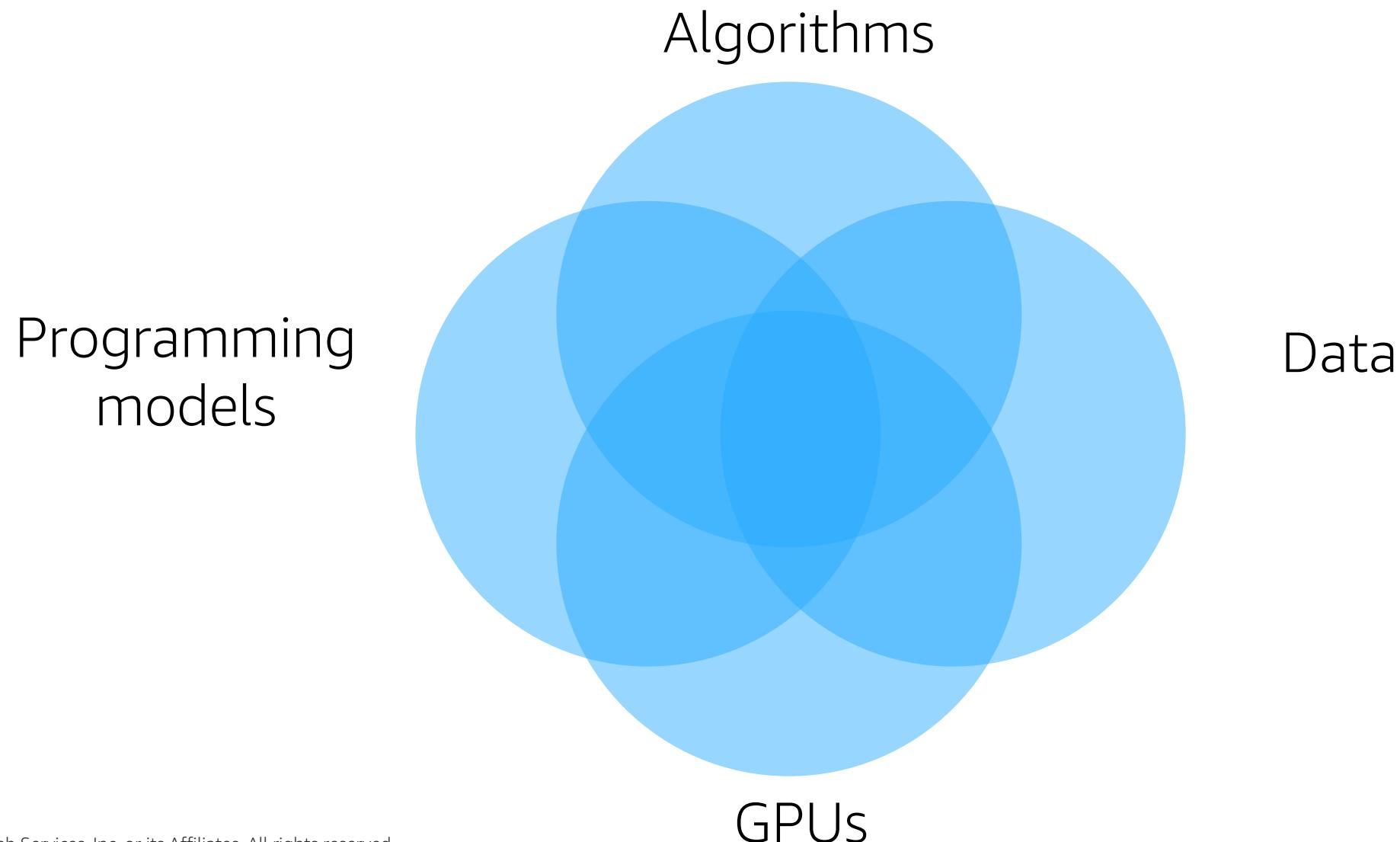
Natural Language Processing (NLP)



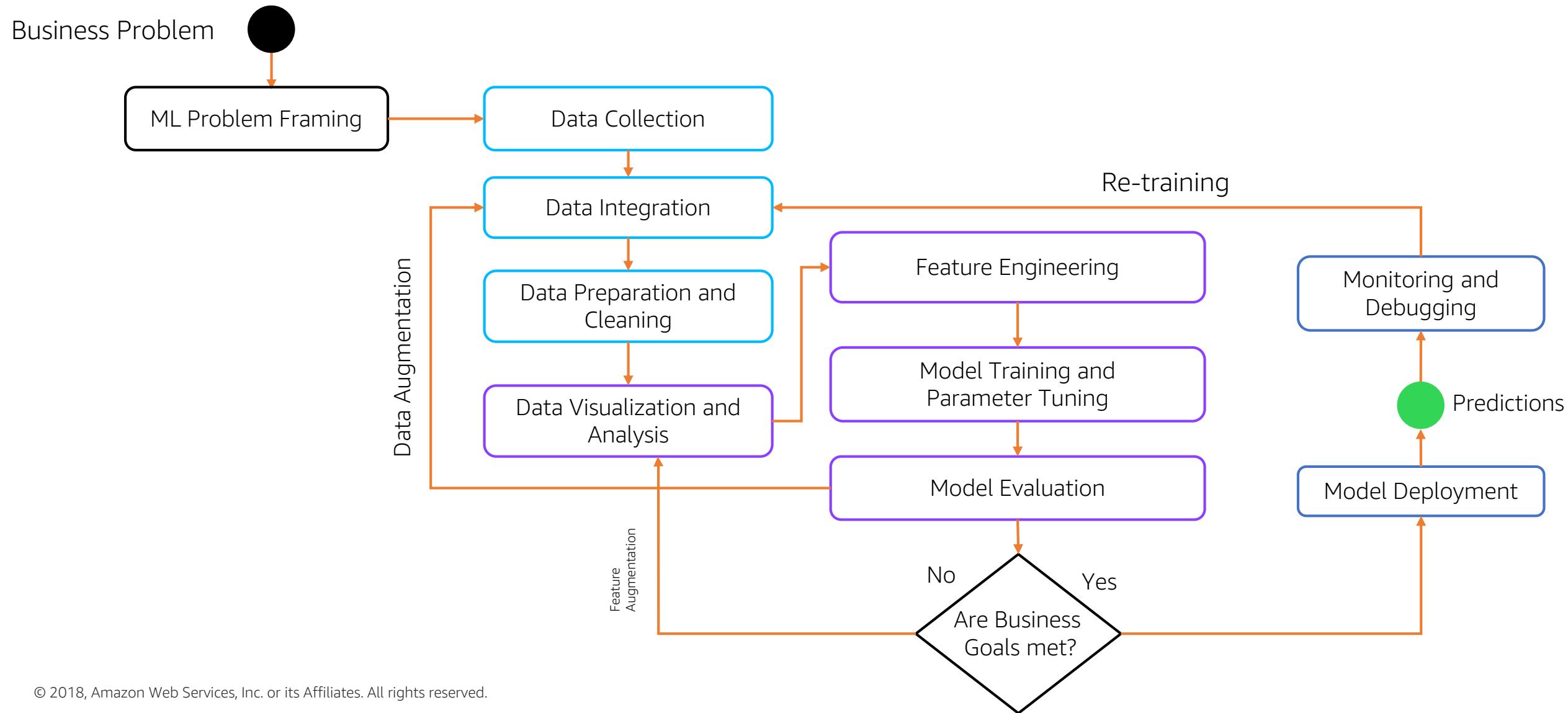
Recommender systems



The Advent of Deep Learning



Typical ML Project Workflow



Running ML Workloads on AWS

Challenge in ML: Expertise

- Limited supply of domain experts
(Data Scientists and Machine Learning experts)
- Expensive to hire or outsource



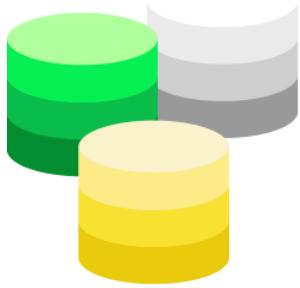
Challenge in ML: Scale

Building and scaling machine learning technology:

- ─ Has many choices of ML tools, but few are supported by the infrastructure that can handle the scale and security required for operationalization.
- ─ Has many moving pieces, which leads to custom solutions *every time*.

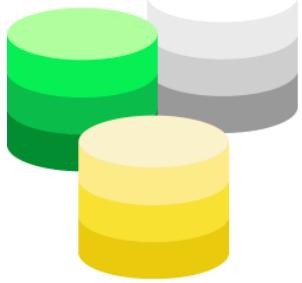


Solving the Problem of Scale



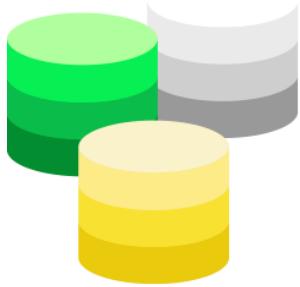
Data

Solving the Problem of Scale



Data Training

Solving the Problem of Scale



Data

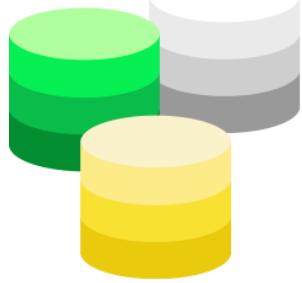


Training



Deployment
(cloud)

Solving the Problem of Scale



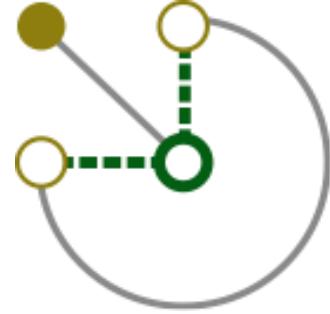
Data



Training



Deployment
(cloud)



Deployment
(edge)

Investments in ML At Amazon



1995

Amazon has invested in AI/ML since our inception, and we share our knowledge and capabilities with our customers.



2017



Product recommendation engine



Robot-enabled fulfillment centers



New product categories



ML-driven supply chain and capacity planning



Natural language processing-supported contact centers



Checkout-free shopping using deep learning

Customers Running ML on AWS



Computer Vision for Crowd-Sourced Maps Using Deep Learning on AWS

aws
training and certification

The Challenge

- High resolution images of locations
- Needed to analyze images and develop their crowd-sourced maps
- Needed to train models to deal with high volumes of public data



Computer Vision for Crowd-Sourced Maps Using Deep Learning on AWS

aws
training and certification

Solution

- Gained insight from unstructured public data
- Improved global mobility and transportation
- Accelerated graphic-intensive workloads using Amazon EC2 P2 and G2 Instances
- Applied their fine grain computer vision algorithms to 142M images and nearly 2M KM of mapped roads

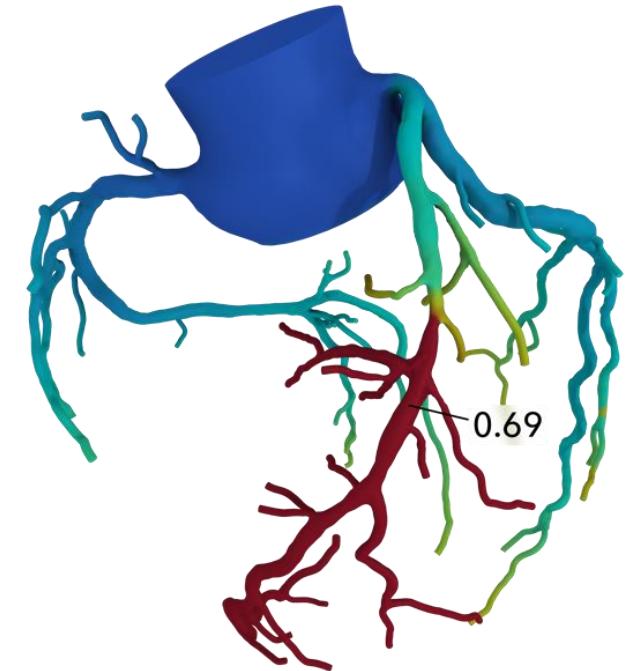


Using Deep Learning to Detect Heart Disease



The Challenge

- Create a personalized medical solution for patients
- Build complex, 3D model for each patient to simulate the flow of blood, vessel by vessel
- Create a fast response to treat patients in an emergency care department

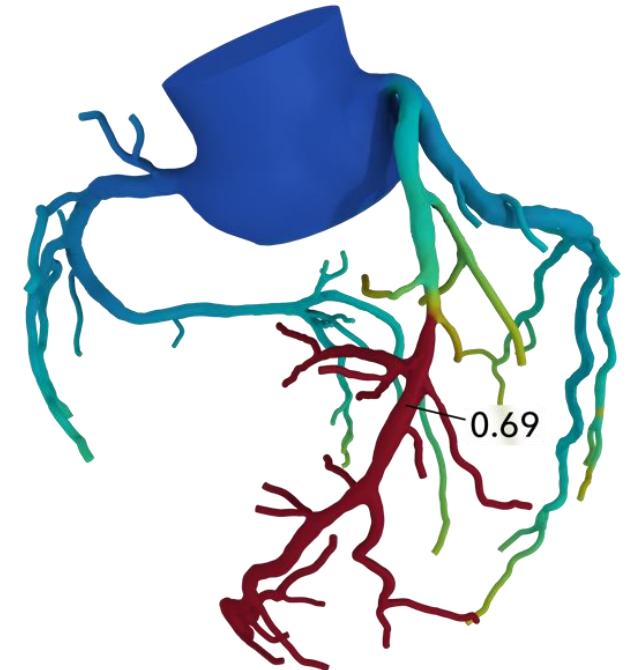


Using Deep Learning to Detect Heart Disease



The Solution

- Accelerated by NVIDIA GPUs, HeartFlow's solution analyzes CT scans to create a 3D model of a patient's heart and coronary arteries.
- In addition to creating an accurate 3D model, the system simulates the flow of blood in each vessel.
- Uses the Caffe deep learning framework on P2 instances; exploring TensorFlow on G3.



Building Deep Intelligence for Autonomous Vehicles

aws training and certification

The Challenge

- Build deep learning algorithms for
 - Computer vision
 - Object detection
 - Per pixel object segmentation
 - Driving simulation
- Deliver real-time accurate positioning in car



Building Deep Intelligence for Autonomous Vehicles



The Solution

- Relies on MXNet to
 - Recognize and track objects
 - Make decisions to avoid collisions and prioritize safety.
- Simulated a billion kilometers of road driving—the largest simulation of its kind in history.
- Used NVIDIA GPUs develop its autonomous driving solution.





Break



Module 2

AWS ML Stack

Accelerate ML adoption by:

- **Providing** every customer with the choice to use their machine learning framework of choice
- **Enabling** machine learning to be readily accessible to data scientists and developers
- **Delivering** the ability to deploy machine learning with ease at scale



AWS ML Stack

AWS ML/DL Stack



Application Services

Platform Services

Frameworks and Interfaces

Infrastructure

Solutions for Every Skill Level



Services

- Designed for application developers
- Solution-oriented prebuilt DL models available via APIs
- Image analysis, language services, conversational UX

Platforms

- Designed for data scientists to address common and advanced needs
- Fully managed platform for enterprise data science
- Reduces the heavy lifting in model training and deployment

Frameworks and Interfaces

- Designed for data scientists to address advanced/emerging needs
- Provides maximum flexibility to use the leading ML frameworks
- Enables expert ML systems to be developed and deployed

1

Making the best use of a data scientist's time

- While the power of ML is unrivaled, data scientists spend around 80% of their time on preparing and managing data for analysis.
- Only 20% of a data scientist's time is used to derive insights and business value.
- Use services like AWS Glue and Amazon Athena to prepare and manage data where start-up time is minutes and not days/weeks/months

AWS ML Adoption Benefits



- 1 Making the best use of a data scientist's time
- 2 Converting the power of ML into business value

- AWS helps improve your business value by streamlining:
 - Model training in cloud
 - Model deployment in cloud and at the edge
- Easy to invoke models in production by calling an API

AWS ML Adoption Benefits



1

Making the best use of a data scientist's time

2

Converting the power of ML into business value

3

Embedding ML into the business fabric

- The value of data science relies upon operationalizing models within business applications and processes.
- 50% of the predictive models built don't get implemented.
- Improve processes, minimize manual intervention, and make better decisions using one-click deployment.

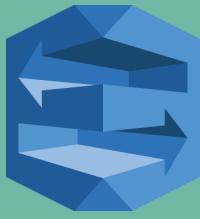
AWS Application Services



Application Services



Amazon
Polly



Amazon
Lex



Amazon
Rekognition



Amazon
Transcribe



Amazon
Translate



Amazon
Comprehend

Platform Services

Frameworks and Interfaces

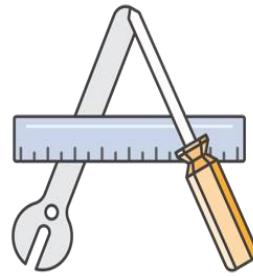
Infrastructure

Amazon Polly

Amazon Polly: Lifelike Speech Service



Converts text
to lifelike
speech



Fully
managed



Custom
lexicons



25 languages,
52 voices



Low latency,
real time

Quality of Speech



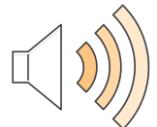
Accurate Text Processing

Ability of the system to interpret common text formats such as abbreviations, numerical sequences, homographs, etc.

"The speed limit is 30 km/h"



"We live for the music," live from the Madison Square Garden



"Peter Piper picked a peck of pickled peppers."



Case Study: Duolingo



“

With Amazon Polly, our users benefit from the most lifelike Text-to-Speech voices available on the market.

Severin Hacker
CTO, Duolingo

duolingo

Duolingo is a free language learning service where users help translate the web and rate translations.

”

When teaching a foreign language:

- Spoken language is crucial.
- Accurate pronunciation matters.

Duolingo built a microservice that focused on:

- Managing text-to-speech (TTS) creation to avoid generating TTS for the same text multiple times.
- Storing pre-generated TTS.
- Delivering pre-generated TTS in an endpoint that is geographically close to the user.

Amazon Polly: Use Cases



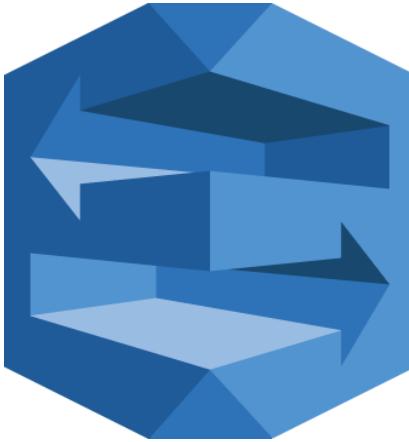
- Text readers for webpages or podcasts
- Public announcements: trains stations, airports, public safety notifications
- Game characters
- E-learning videos
- Interactive voice responses (IVRs)
- Contact centers

Amazon Lex

Text and Speech Understanding



Automated speech
recognition in English and
Spanish



Natural Language
Understanding (NLU)

Amazon Lex **builds natural, conversational interactions in voice and text.**

Powered by the same deep learning technology as **Alexa Voice Services**.



Amazon Lex: Use Cases - Chatbot



I'd like to book a flight to London

Sure! Do you want to fly to Heathrow or Gatwick?

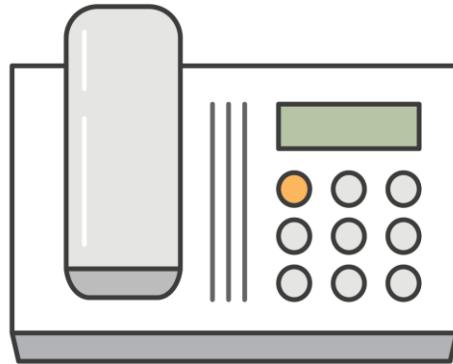
Destination:
LHR

Heathrow, please

When would you like to fly?

Departure:
October 22, 2018

Next Sunday



Feature Phone Bots

- Integrated with Twilio for SMS
- Ideal for quick intent-based requests



Call Centers

- Optimized for 8Khz call audio
- Direct integration with Amazon Connect (IVR)
- Amazon Connect can fall back to agent

OhioHealth – Lex Integration



“

“Amazon Lex represents a great opportunity for us to deliver a better experience to our patients. Everything we do at OhioHealth is ultimately about providing the right care to our patients at the right time and in the right place.

Amazon Lex’s next generation technology and the innovative applications we are developing using it will help provide an improved customer experience. We are just scratching the surface of what is possible,”

Michael Krouse

Senior Vice President and CIO – Ohio Health



”

- Delivers personalized care recommendations
- Makes customer appointments
- Drives urgent care referrals

Amazon Lex: Benefits



Automated Speech Recognition (ASR) is well-suited for intent-based conversations.

- ❖ Augmented by Amazon Transcribe for voice recordings (e.g., > 15 seconds)

Easy to integrate with corporate applications

- ❖ Only developer experience required (e.g., no data science expertise required)

Amazon Rekognition

Amazon Rekognition

aws training and certification

Deep learning-based image and video analysis



Object, scene, and activity recognition



Facial recognition



Facial analysis



Person tracking



Unsafe content detection



Celebrity recognition



Text in images

Media Case Study



Using Amazon Rekognition to identify who is on camera

- Provided to each of 8 networks
- Recorded video streams can be indexed and searched by subject



Details:

- Indexed 97,000 people into a face collection in 1 day
- Sample frames every 6 secs and test for image variance
- Upload images to Amazon S3 and call Amazon Rekognition to find the best facial match
- Store time stamp and facelD metadata

Amazon Rekognition Use Cases



Use Cases

Searchable image library

Face-based user verification
facial recognition

Detect inappropriate content in
images

Sentiment analysis
Celebrity identification

Openinfluence

influicity



THE TAKE



witlee

Artfinder

CITY OF
ORLANDO



Amazon Transcribe

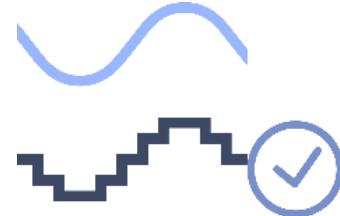
Amazon Transcribe



Automatic conversion of speech into accurate, grammatically correct text



English and Spanish language support



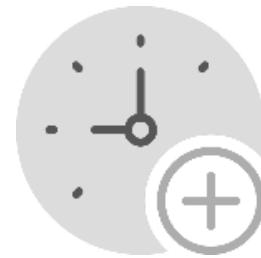
Support for telephony audio



Intelligent punctuation and formatting



Recognize multiple speakers



Timestamp generation



Custom vocabulary

Amazon Transcribe: Use Cases



Call centers

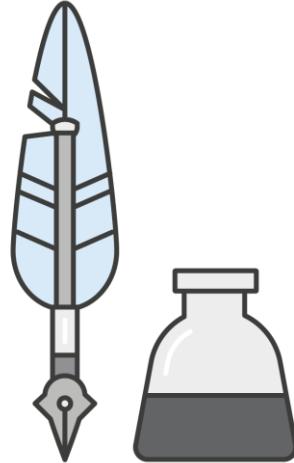
- Transcribe 8Khz call recordings with high accuracy
- Analyze the text with Amazon Comprehend
- Visualize results on Amazon QuickSight



Subtitles for video on-demand (VODs)/closed caption

- Transcribe the audio/video to text
- Post-edit/QA
- Translate to language of choice
- Align the text with the video based on time stamp

Amazon Transcribe: Use Cases



Transcribe meetings

- Save recordings to Amazon S3
- Transcribe the recordings
- Index text using Amazon ES
- Search and discover content on demand

Amazon Transcribe: Benefits



Additional takeaways

- Can be used for exception handling or analytics
- Integrate with Amazon Comprehend for contextual analysis
- Enhance transcripts with Amazon Mechanical Turk

Amazon Translate

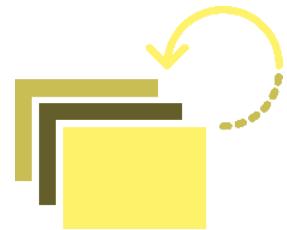
Amazon Translate



Natural and fluent language translation



Real-time translation



Batch analysis



Automatic language
recognition



Low cost

Who Should Use Amazon Translate?



Any business with customers who speak languages other than the ones your business speaks today



Amazon Comprehend

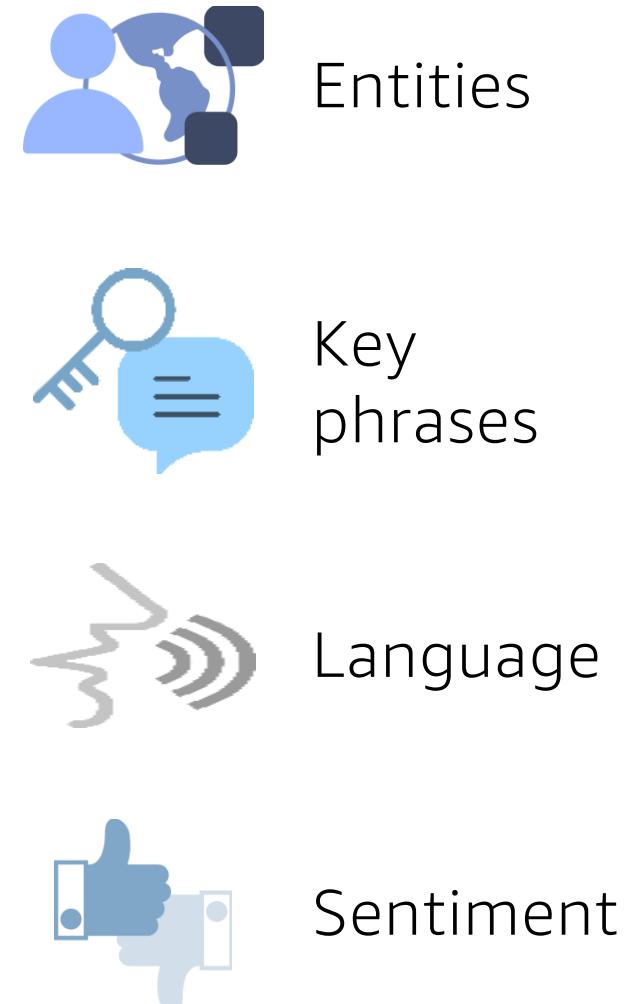
Amazon Comprehend

aws training and certification

Discover insights and relationships in text



Amazon
Comprehend



Amazon Comprehend Topic Modeling



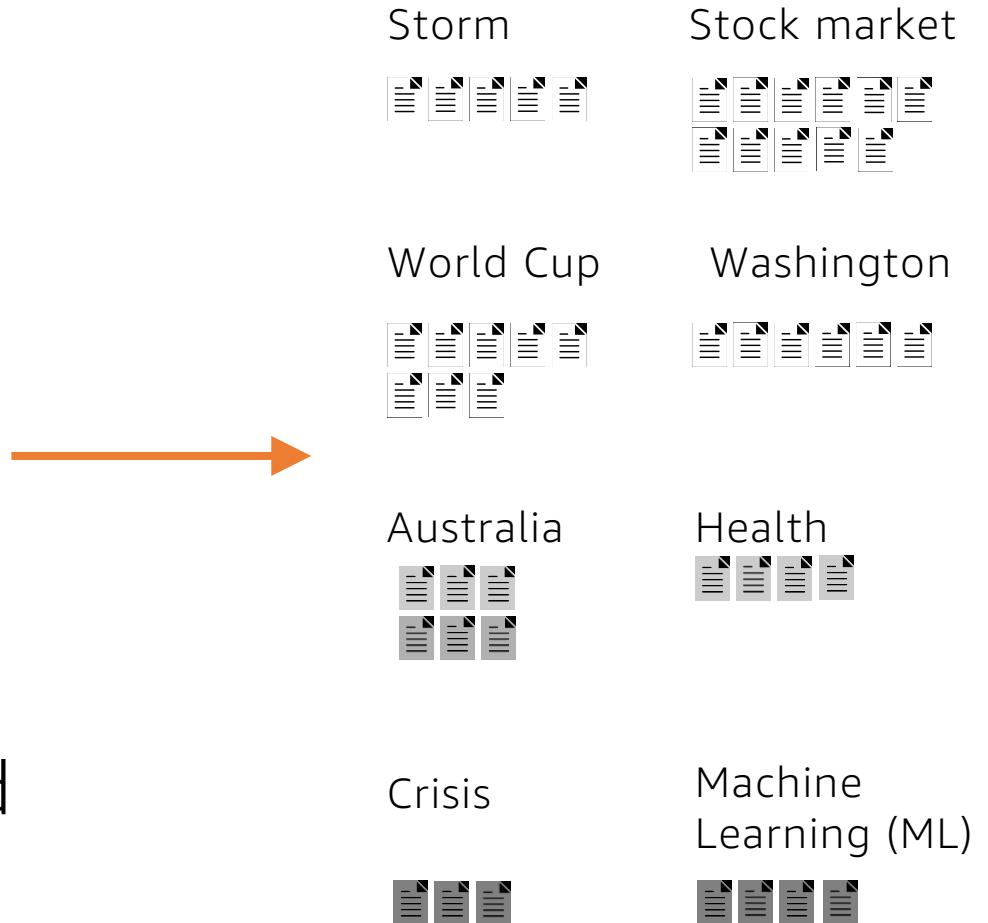
Discover insights and relationships in text



Library of news
articles



Amazon
Comprehend



Common Use Cases



Voice of Customer Analytics

Analyzing what customers are saying about your brand, products, and services or to your call center agents



Semantic Search

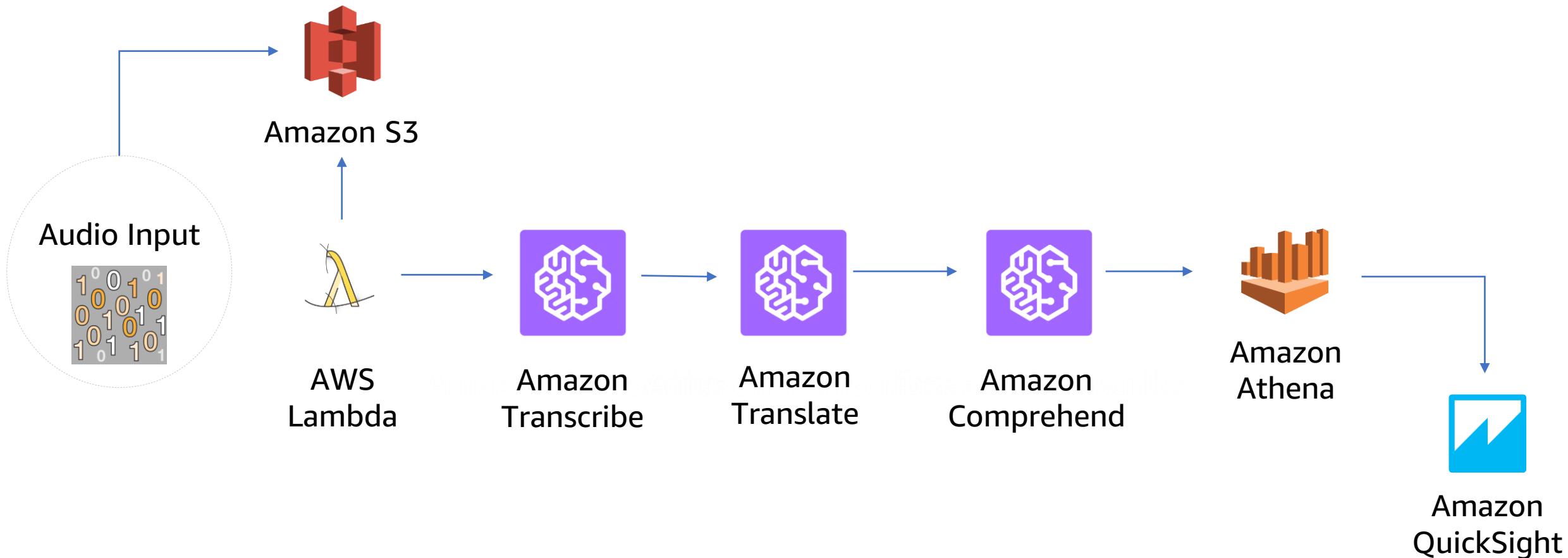
Making search smarter by searching on key phrases, sentiment, and topic



Knowledge Management/Discovery

Organizing documents, categorizing by topic, and personalizing experiences

Using AWS ML Services together

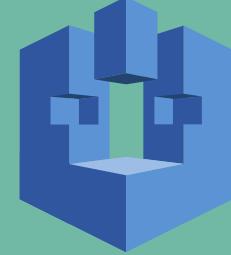


AWS Platform Services

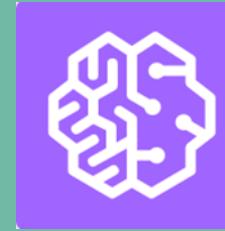


Application services

Platform services



Amazon
SageMaker



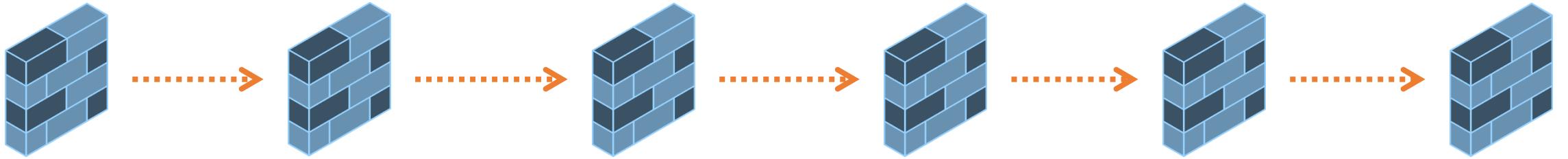
AWS
DeepLens

Frameworks and Interfaces

Infrastructure

Amazon SageMaker

ML is Still Too Complicated for Everyday Developers



Collect and prepare
training data

Choose and
optimize your ML
algorithm

Set up and manage
environments for
training

Train and tune
model
(trial and error)

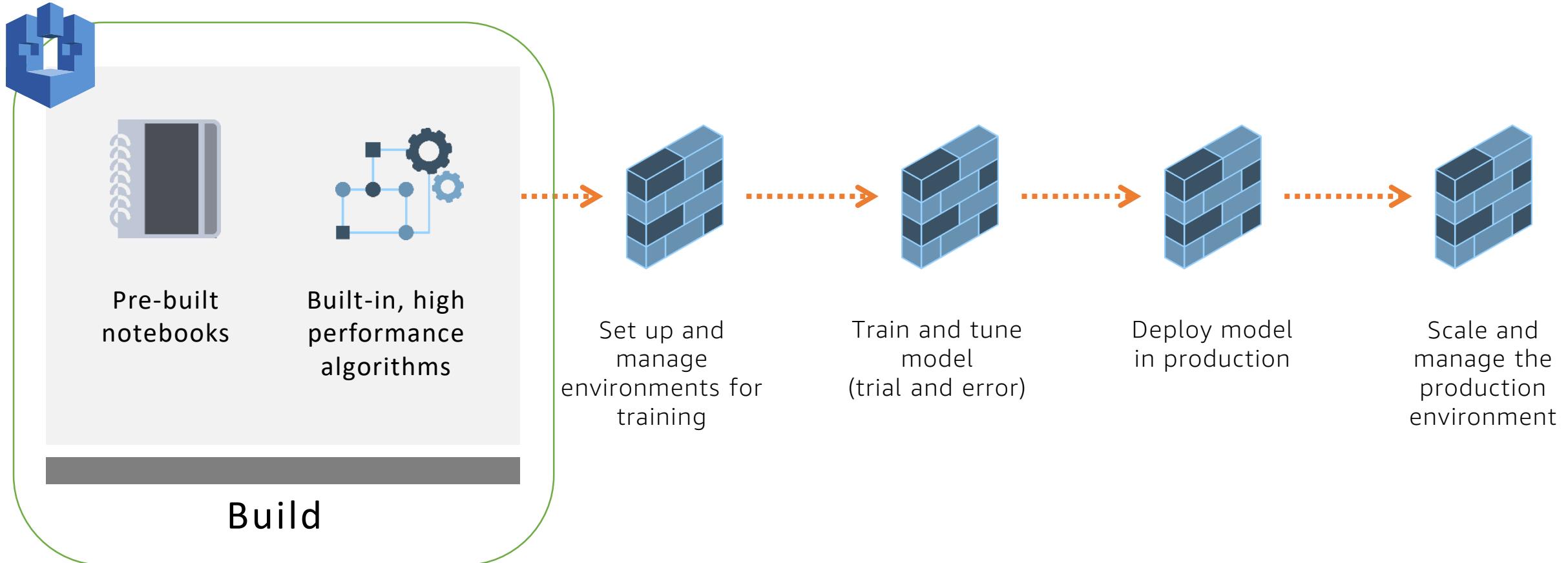
Deploy model
in production

Scale and manage
the production
environment

Amazon SageMaker



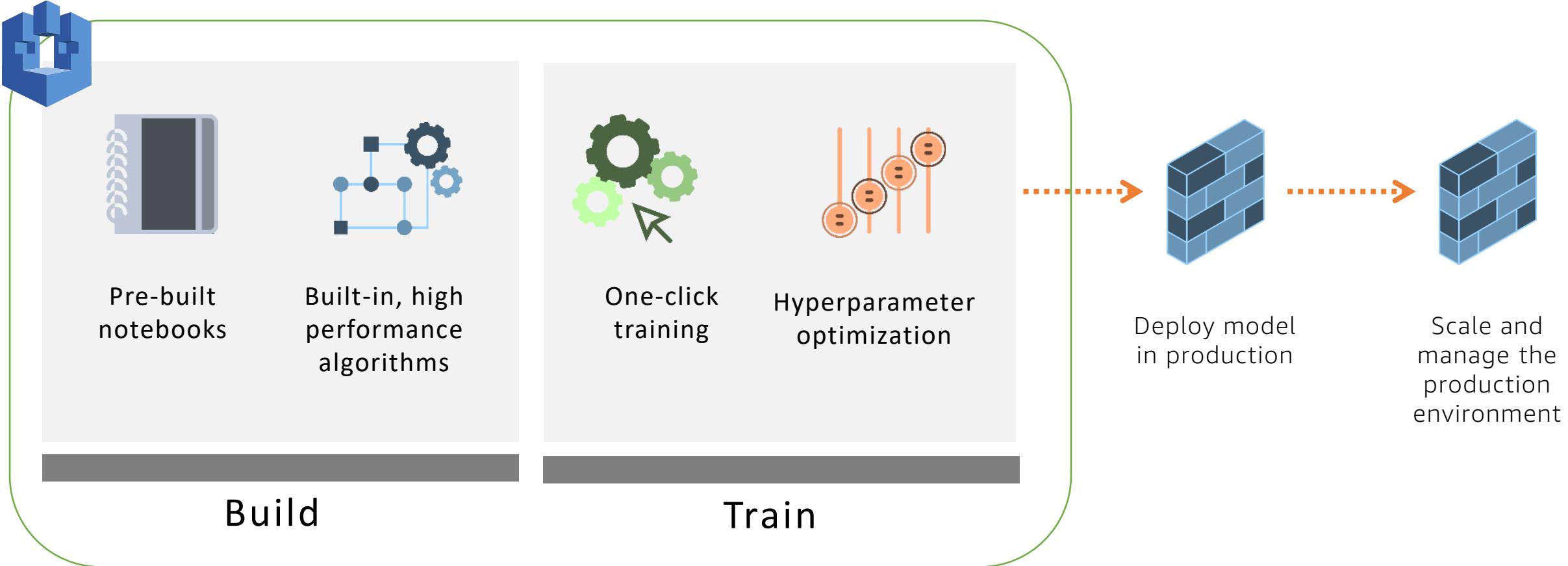
Easily build, train, and deploy machine learning models



Amazon SageMaker



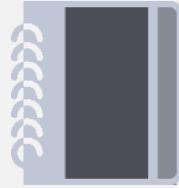
Easily build, train, and deploy machine learning models



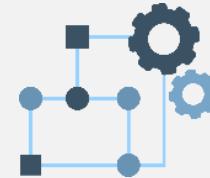
Amazon SageMaker



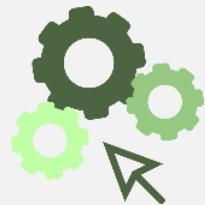
Easily build, train, and deploy machine learning models



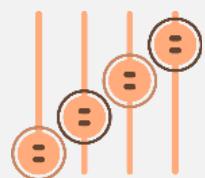
Pre-built
notebooks



Built-in, high
performance
algorithms



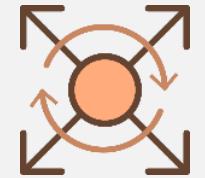
One-click
training



Hyperparameter
optimization



One-click
deployment



Fully managed
hosting with
auto-scaling

Build

Train

Deploy

Amazon SageMaker



“

We're focused on making it faster and easier than ever to hire and get hired, training our machine learning algorithms against hundreds of millions of historical transactional activities in order to deliver highly relevant job matches as quickly as possible. Amazon SageMaker provided us with an answer to problems we had with ML workflow management, allowing us to train, evaluate and deploy models in a flexible way. In addition, Amazon SageMaker's modularity provides the ability to build and create models independently, which is a compelling feature for ZipRecruiter.

”

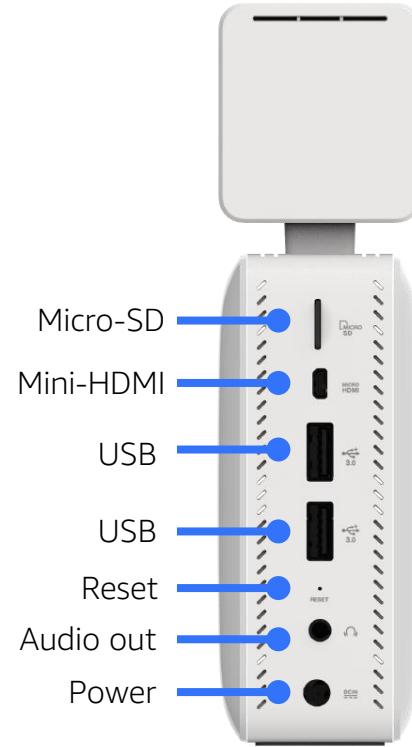
- Avi Golan, VP of Engineering, ZipRecruiter

AWS DeepLens

AWS DeepLens



HD video camera



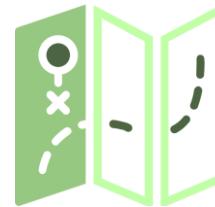
Custom-designed
deep learning
inference engine



HD video camera with
on-board compute
optimized for deep
learning



From unboxing to first
inference in <10
minutes



Integrates with Amazon
SageMaker and AWS
Lambda

Tutorials, examples, demos,
and pre-built models

AWS Frameworks and Interfaces



Application Services

Platform Services

AWS Frameworks and Interfaces

AWS Deep Learning AMIs

Caffe2

CNTK

Apache
MXNet

PyTorch

TensorFlow

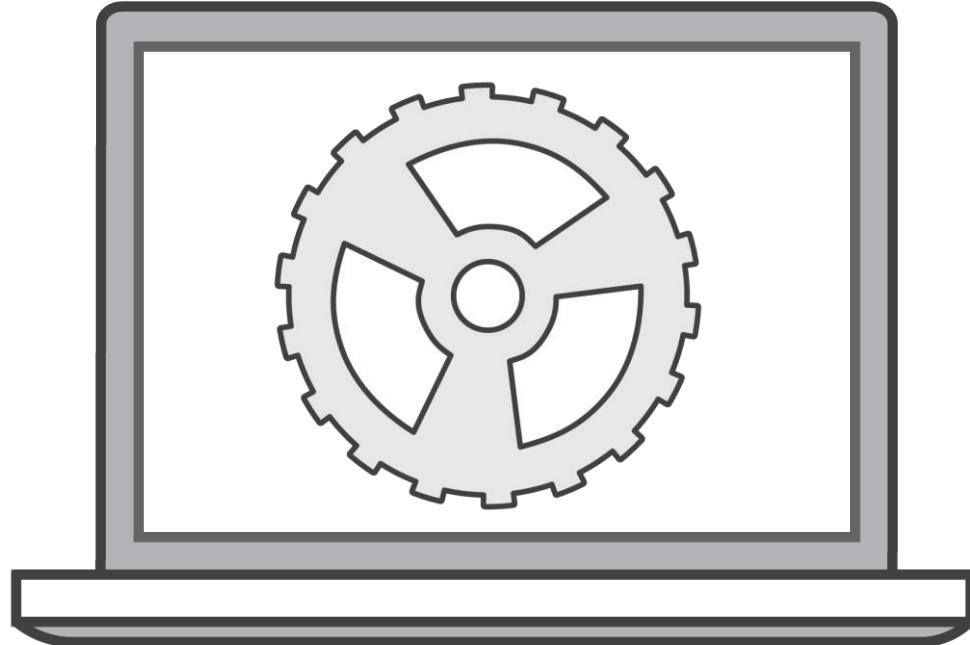
Torch

Keras

Gluon

Infrastructure

Running Deep Learning Frameworks



AWS deep learning AMIs:

- Provide tools to develop deep learning models in the cloud
- Are scalable
- Support managed auto-scaling clusters of GPU for large-scale training

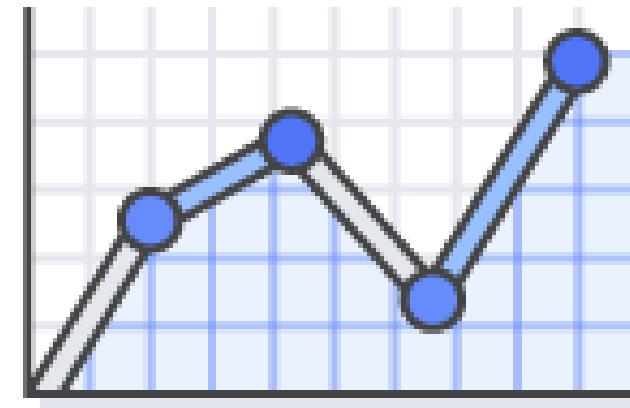
The following deep learning frameworks are supported by those AMIs:

- MXNet, TensorFlow, Caffe, Caffe2, Keras, Theano, Torch, and Microsoft Cognitive Toolkit
- Includes Gluon and Keras

Extracting Actionable Insights with Deep Learning



- Extract valuable information about **markets and consumers** from mountains of documents and publicly available data.
- Uses **convolutional neural networks** running on AWS to analyze large amounts of data in order to recognize and extract actionable insights for its clients.
- Built a solution in **less than 3 months** using the AWS Deep Learning AMI and TensorFlow.



Gluon: A high level DL Interface



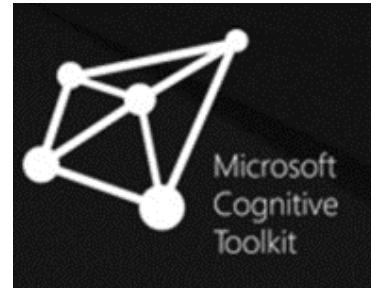
- cube Improves speed, flexibility, accessibility of deep learning technology to developers
- cube Supports multi-frameworks

Simple, easy-to-understand code

Flexible, imperative structure

High performance

Open Neural Network Exchange (ONNX)



- Developers can choose the framework that best fits their needs
- Apache MXNet is now a supported framework joining PyTorch, Caffe2 and Cognitive Toolkit (CNTK)

AWS Infrastructure



Application services

Platform services

Frameworks and Interfaces

Infrastructure

GPU instances

CPU

IoT/Edge

Amazon EC2 P3 Instances

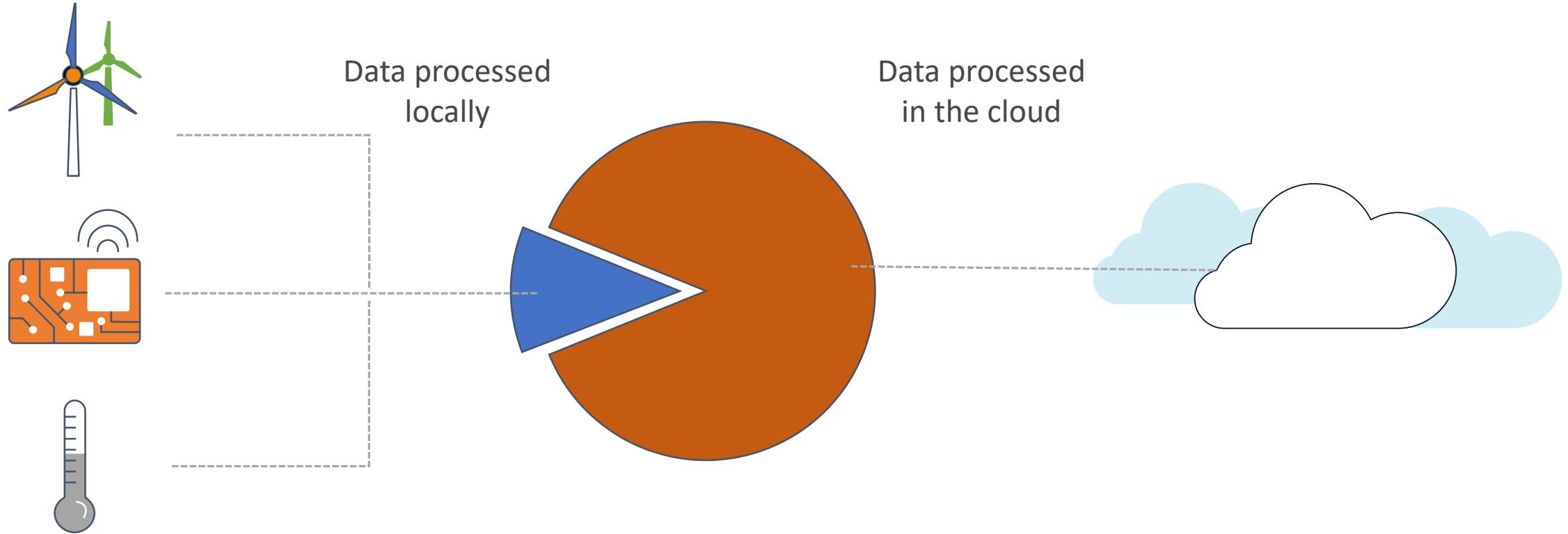


- Offer up to 8 NVIDIA V100 GPUs in a single instance
- Support the **16xlarge** size, which provides:
 - A combined **128GB** of GPU memory, more than **40,000** CUDA cores
 - More than **125 teraflops** of single-precision floating point performance
 - More than **62 teraflops** of double-precision floating point performance
- ~**14X faster** than P2



IoT/Edge Devices

AWS Greengrass ML Inference



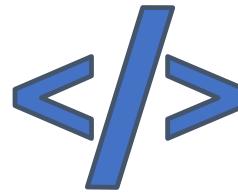
Benefits of AWS Greengrass



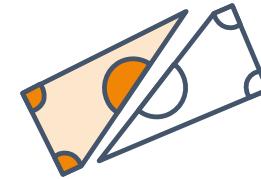
Respond quickly
to local events



Operate
offline



Simplified
device
programming

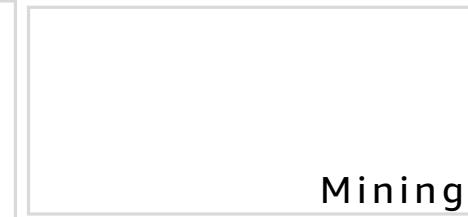
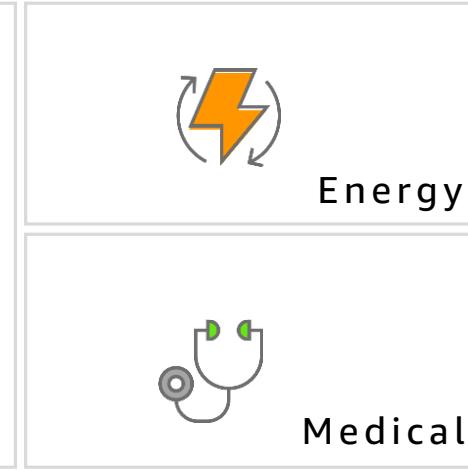
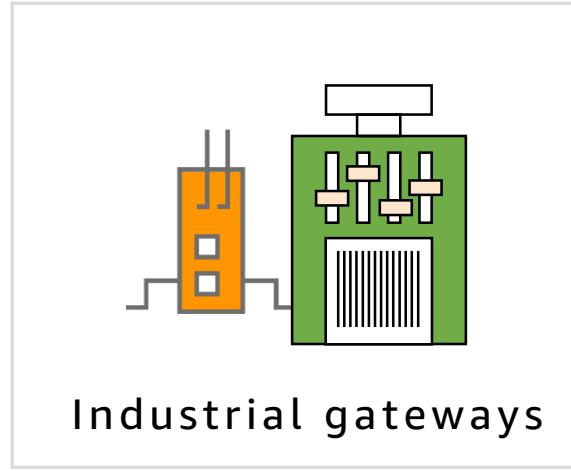


Reduce the cost of
IoT applications



AWS-grade
security

Use Cases



Rio Tinto: Machine Learning at the Edge



RioTinto



Challenge

- 큐 Remote locations
- 큐 Limited connectivity
- 큐 High risk with expensive machinery

Solution

- 큐 Calculate road roughness at the edge
- 큐 Create an online heat map
- 큐 Link to cloud-based machine learning
- 큐 Real-time alerts and machine-to-machine communication

Impact

- 큐 Preventive road maintenance
- 큐 Reduced machinery downtime



Module 3

Identify and Qualify ML Opportunities



Break

Identifying an ML Opportunity

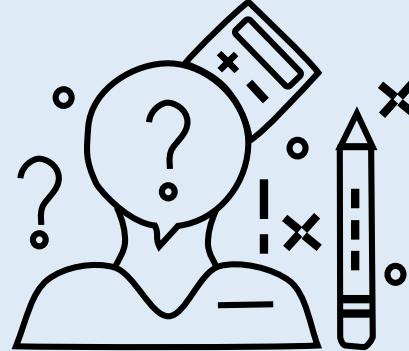
Customer Personas for ML



Inquisitors

Interested in ML

Limited resources



Adopters

Some expertise
in-house

Mainly in siloed
projects



Experts

Strong expertise
in-house

ML embedded in
apps or work streams

Inquisitors: Assessing Readiness



Inquisitors

Description

- 💡 Interested in ML
- 💡 Neither have the expertise nor an identified use case to focus on

Conversation

- 💡 Speak about the “art of possible” and what similar customers have done

Target Outcome

- 💡 Identify possible use cases
- 💡 Validate business opportunities
- 💡 Assess the potential to drive business value

Use Case Scenario: Related Applications



Retail

- Recommendation engines
- Customer scoring

FinServ

- Personalized banking
- Credit risk management

Life Sciences

- Assisted radiology, scans
- Preventive medicine

Public Sector

- Tax fraud detection
- Citizen self-service

Energy and Utilities

- Demand forecasting
- Preventive maintenance

Insurance

- Claim analysis and triage
- Automated customer service routing

Inquisitors: Identifying Use Cases



- 💡 “Are you **currently evaluating** how ML technologies and capabilities can be harnessed to **create new insights** from your data?”
- 💡 “Are you trying to understand how to **evolve your data analytics** from **static reporting** on historical data and events to **using ML** that enables pre-emptive actions?”

Inquisitors

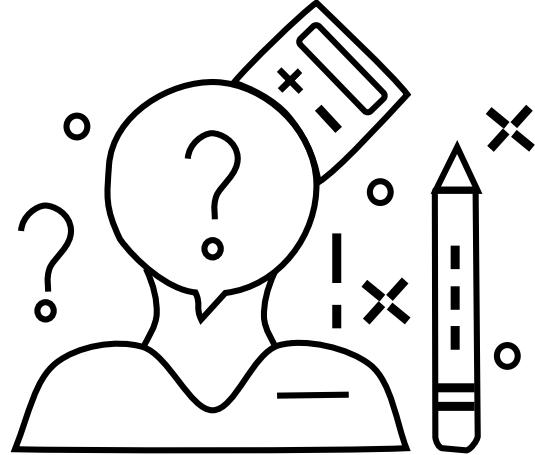
Inquisitors: Identifying Use Cases



Inquisitors

- ❖ "Are you aware that AWS offers not just analytics tools or AI tools, but **a holistic data platform** that can allow you to **answer your business questions** from your data, **make predictions** about the future, and **take action**?"
- ❖ "Are you **already evaluating specific machine learning platforms** or technologies to accomplish things?"

Adopters: Assessing Readiness



Adopters

Description

- 💡 Limited expertise in ML space

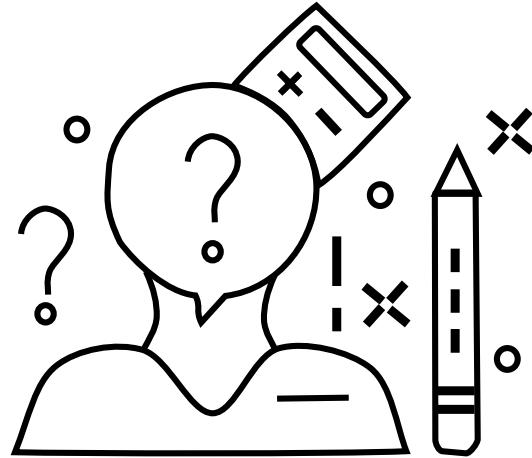
Conversation

- 💡 Speak about a few high-level use cases mapped to clear business value-chain opportunity

Target Outcome

- 💡 Drive POCs with opportunities to “learn by doing”

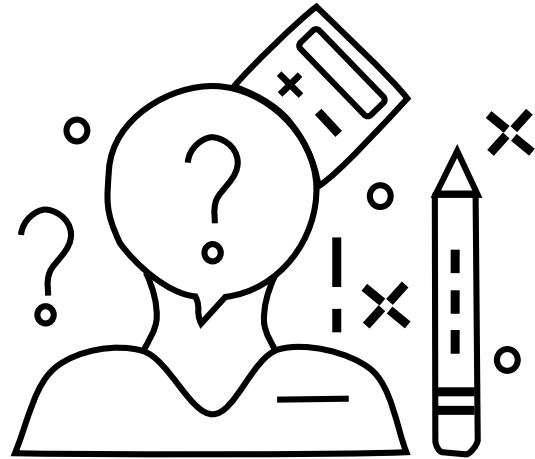
Adopters: Identifying Use Cases



Adopters

- “Where have you seen the **greatest value** using AI and ML technologies to create new insights?”
- “How have you **evolved your data analytics** to incorporate ML? How does it answer questions from your data, make predictions about the future, and take action?”

Adopters: Identifying Use Cases



Adopters

- “How do you **currently integrate** your ML into your various applications?”
- “Which machine learning **platforms or technologies** do you prefer?”

Experts: Assessing Readiness



Experts

Description

Have either:

- ▀ Been in ML space for a while
- ▀ Or analytics is already a key part of the business' value

Conversation

- ▀ Discuss the cutting-edge use cases in their industry

Target Outcome

Deep-dive on:

- ▀ Cutting-edge concepts
- ▀ Optimizing ML on AWS
- ▀ Identification of mutual growth opportunities

Experts: Identifying Use Cases



Experts

- ❖ “How have you **embedded AI and ML** in your day-to-day processes and activities?”
- ❖ “What **new areas of the business or operations** do you see AI and ML benefiting next? How?”

Experts: Identifying Use Cases



Experts

- ─ “Are there **bottlenecks** in your technology, infrastructure, or integrations that limit your ability to use AI and ML?”
- ─ “What are your **next frontiers** in innovating around AI and ML?”

Qualification Questions



Current State and Initiatives

What are your top business or operational priorities?

Where do you currently employ machine learning?

Do you currently have scientists on staff? Do they have any areas of specialty?

What ML technologies are you using today?

Where is the bulk of your data used for analysis currently stored?



Challenges

What critical business issues are you addressing with your ML initiatives?

What challenges have you faced in executing your ML initiatives?

How have you overcome these challenges?

Would you be open to outside assistance to overcome the challenges?



Dependencies

Who are the stakeholders involved in the ML initiatives?

What are your existing investments in ML capabilities?

Are there imperative ML initiatives in your backlog? What are your timelines?

What budget is allocated to accomplish these initiative?



Impact

Have you calculated an ROI and/or created a business case for such initiatives?

How will each of these initiatives impact your business financially? Competitively?

What is the impact if you do not undertake these initiatives?

Do you alternative paths to address the business needs served by these initiatives?

ML Journey: Qualification Example



Does your customer currently have a **data scientist on staff**?

- ✖ **No:** Start by understanding the customer's desire and ability to accept assistance from third parties.
- ✓ **Yes:** Begin by understanding where the data scientist is aligned within the business, their quantity and skill set, and their ability to take on additional workloads.

ML Journey: Qualification Example



Has your customer assessed the **business value** associated with the initiatives they'd like to undertake?

- ✖ **No:** Identify the key metrics impacted by each ML initiative and assist with a business case and/or ROI analysis.
- ✓ **Yes:** Review the business case and/or ROI and identify additional areas of value or alternative methods to capture value from the use case.

ML Journey: Qualification Example



Does your customer have the ability to **operationalize the results** of ML?

- ✗ **No:** Work with solution architects to identify the most effective approach to operationalizing the outputs.
- ✓ **Yes:** Assess the level of effort for any minor system or process changes that need to occur. It's important that this is well vetted, otherwise the results of the ML may lay dormant and become stale.

ML Journey: Qualification Example

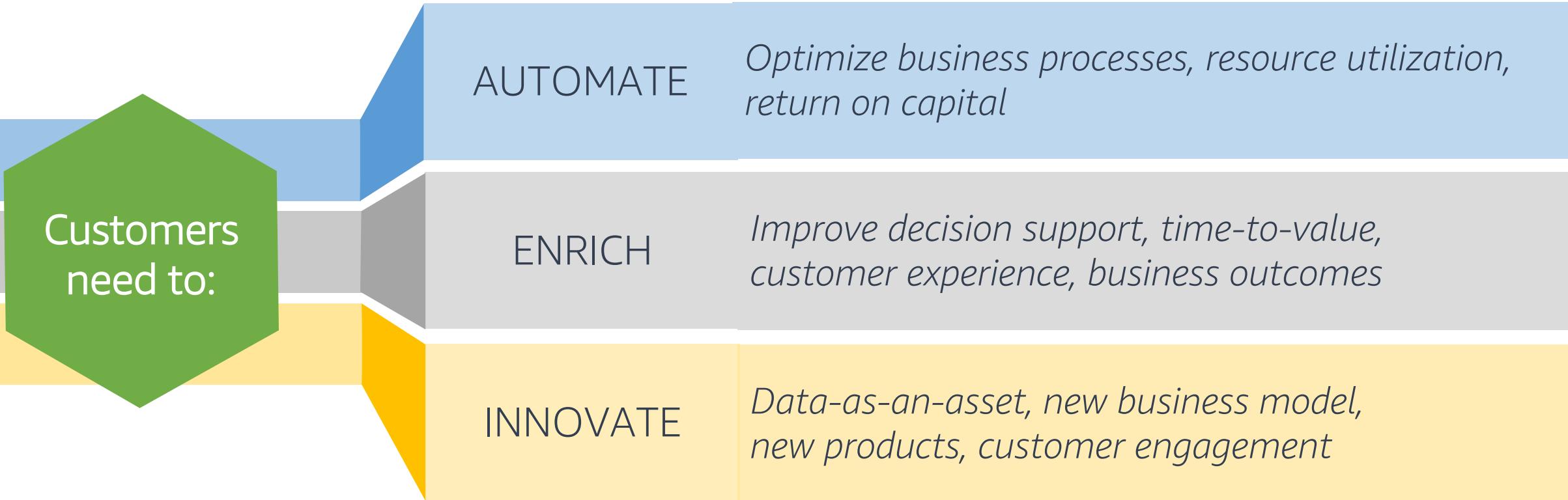


Does your customer have the **data available and accessible** to support the desired use cases?

- ✖ **No:** Start by identifying and prioritizing the missing data sources, and create a plan to onboard such data in advance of executing on the dependent use cases.
- ✓ **Yes:** Validate that the appropriate data is available in volume, history, and completeness. Begin reviewing sample data and documenting any gaps or questions that may arise.

Identifying Key Stakeholders

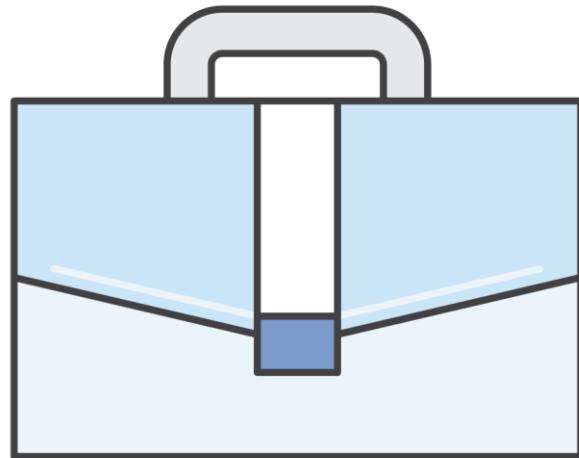
Machine Learning Trends



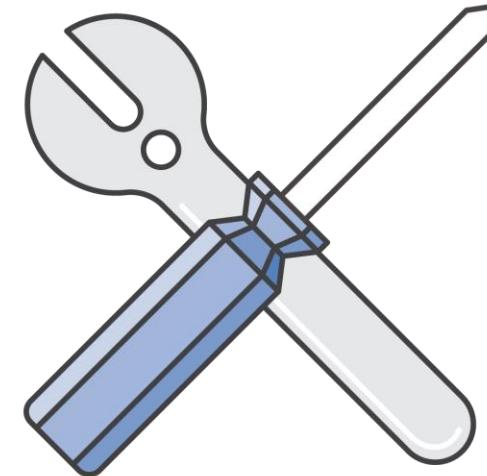
Who Cares about Machine Learning?

aws training and certification

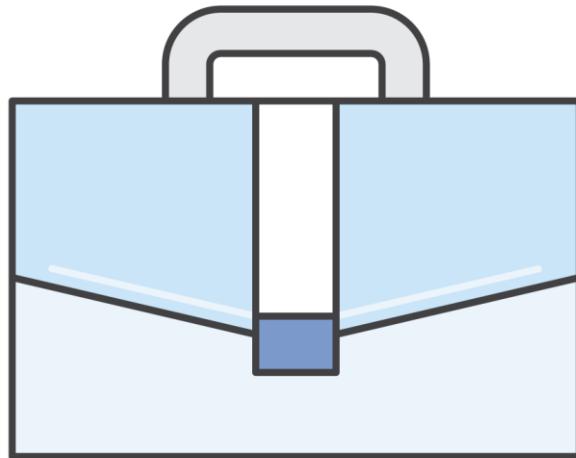
BUSINESS



TECHNICAL



BUSINESS

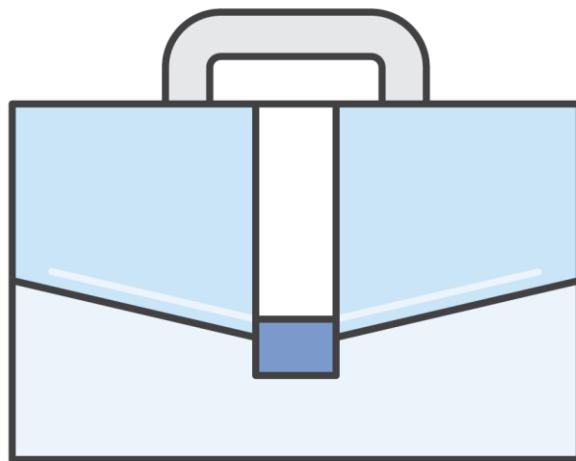


- Driving to create evolutionary or revolutionary change by injecting ML into their business operations
- Traditionally not interested in reviewing technologies, but rather prefer to focus on their business needs
- **Needed:** Business-centric solutions that can address the identified and prioritized use cases

Who Cares about Machine Learning?



BUSINESS



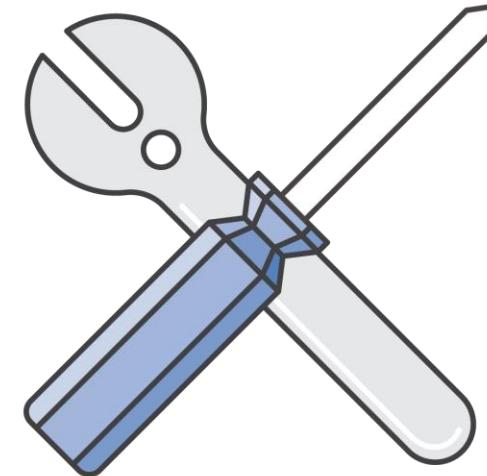
	Job Titles	Goals
Business Executives	COO, CFO, CMO, SVPs, etc.	Drive change by encouraging both evolutionary and revolutionary changes with the business, products, features, customer experience, and operations
Line of Business Managers	VPs, Directors, Senior Managers	Drive change by implementing new fact-based decision-making processes into the day-to-day business, product and feature development, customer experience, and operations
Subject Matter Experts, Operators	Business Analysts, Program Managers, etc.	Leverage the insights pushed into the downstream systems to improve the transactional effectiveness of the business

Who Cares about Machine Learning?



- Technical executives and leaders of advanced solutions who can employ machine learning to serve their business customers
- Those who are responsible for the technology the business runs on, including data, insight generation, and end-user/customer-facing systems
- Those with the new expectation that data scientists and data engineers **deliver valuable insights** to the business

TECHNICAL

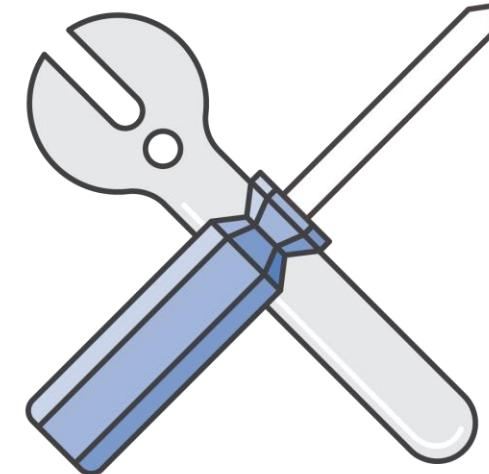


Who Cares about Machine Learning?



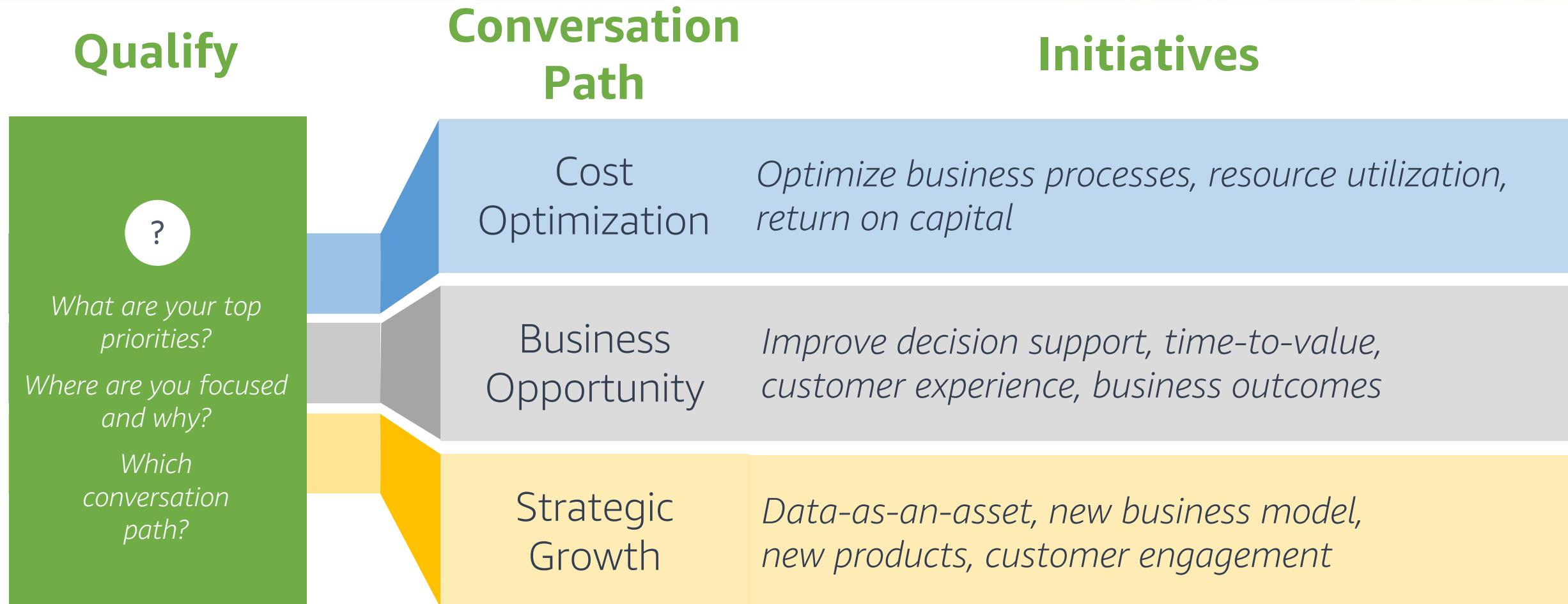
	Job Titles	Goals
Technology Executives	CTO, CIO, Chief Data Officer, Chief Innovation Officer, etc.	Drive systemic intelligence systems to support business, mission, and operational targets. Focused on both reducing costs and/or increasing the revenue to the business
Data & Insight Practitioners	Data Scientists, Data Engineers, etc.	Leverage analytics and ML to improve tactical business outcomes Support both ad hoc and systemic programs which operationalize insights
Information Technology Practitioners	App Developers, Data Architects, etc.	Integrate insights into downstream systems for end-user consumption Embed methods to continually deliver powerful insights into applications

TECHNICAL



Starting an ML Project

Conversation Paths



Trigger Words

Channel expansion

Maintenance

Event detection

Improve customer service/experience

Supply chain

Optimize skills

New revenue streams

Revenue leakage

New products

Data-as-an-asset

Forecasting

New business ideas/processes/model

Process automation

Customer support

Self-service

Business agility

Anomaly detection

Performance measurement

Trigger Words: Alignment Questions



Trigger Words

Channel Expansion

Improve Customer Service/Experience

New Revenue Stream

Data-as-an-asset

Alignment Questions

"What are your plans to **extend your channels** to reach customers?"

"What **initiatives** are you currently leading to increase your customer support experience?"

"What are your plans to **drive revenue growth** in the coming 6 to 12 months?"

"How is your Chief Data Officer currently helping the lines of business to make the **best use possible of corporate data**?"

Trigger Words: Differentiation Questions



Trigger Words

Channel Expansion

Improve Customer Service/Experience

New Revenue Stream

Data-as-an-asset

Differentiation Questions

"How would **measuring the efficiency** of your different channels help you increase sales profitability?"

"What would be the **impact** of having a **near real-time dashboard** that analyses the brands, products, and features that your customers are interacting with you about, as well as their sentiment about them?"

"What **additional new sources of revenue** could be unveiled if you had unfettered and immediate access to customer data?"

"As a consumer of data, how would having a data lake with line of sight to corporate data help you **drive strategic decisions** or **build new products and services**? What if you had minimal friction in consuming it?"

Trigger Words: Alignment Questions



Trigger Words

Process Automation

Alignment Questions

"What **business processes** are high on your priority list to **automate**, and why?"

Business Agility

"What **business decisions** are slower than you'd like due to lack of data to make them?"

Maintenance

"What **maintenance requirements** in your business would you like to be more proactive about?"

Supply Chain

"What portions of your supply chain have the **most friction or unpredictability**?"

Trigger Words: Differentiation Questions



Trigger Words

Process Automation

Differentiation Questions

"What **automation initiatives** could be undertaken through machine learning?"

Business Agility

"How could a **data lake and a data catalog** help you **gain visibility** into key performance indicators (KPIs), as well as **make predictions** as to how the KPIs will trend in the next few days or weeks?"

Maintenance

"How would it help you to have **predictive guidance** indicating which customers and products are more likely to require support, and proactive remediation before a customer complaint, or downtime, occurs?"

Supply Chain

"How would it help you to **identify the root causes** of the friction and initiate proactive remediation before an impactful event occurs?"

Trigger Words: Alignment Questions



Trigger Words

Revenue Leakage

Alignment Questions

"Where in your **processes or systems** is the most **unnecessary loss of revenue**?"

Forecasting

"When looking into your business, where is forecasting most **impactful** to your **operational planning**?"

Customer Support

"What are the **highest cost areas** of customer support? Do you believe that customers could **self-service** in some of these areas?"

Anomaly Detection

"How does **variability** in your business and operations effect your bottom line?"

Trigger Words: Differentiation Questions



Trigger Words

Revenue Leakage

Differentiation Questions

"How would it help you to identify the **key drivers** of these losses and prevent them from occurring in the future?"

Forecasting

"How would it **impact your business** if you could provide accurate short- and long-term forecasts?"

Customer Support

"If you could drive customers to more effective, lower-cost channels, what would the **impact on costs** and **customer experience** be?"

Anomaly Detection

"What would it mean to your business if these events could be either or

Trigger Words: Alignment Questions



Trigger Words

Optimize Skills

Alignment Questions

"What **skill sets** are most **impactful** to your customer experience, operational costs, or EBITDA?"

New Products

"What **blind spots** do you have when innovating new products or features?"

Performance Measurement

"What **areas** of your business or operations are **lacking from measurement** and impacting your ability to continually learn and improve?"

Trigger Words: Differentiation Questions



Trigger Words

Optimize Skills

Differentiation Questions

"How would it impact your business if you **apply the right resources to the right job?**"

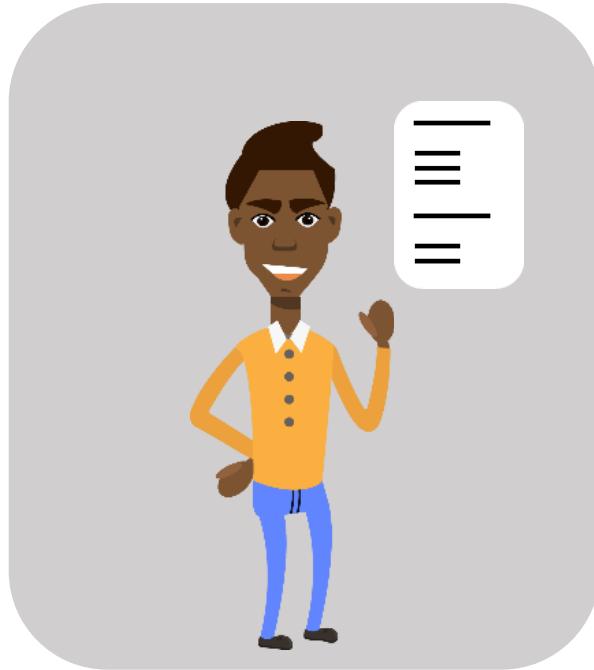
New Products

"How would it impact your new product development process if those **blind spots** could be **filled with fact-based insights?**"

Performance Measurement

"How would it impact your business if, when fluctuations arose, **each process was measured, reported, and provided with automated alerts?**"

Discovery Workshop



Half-day Discovery Workshop

- Business value assessment
- Ability to implement
- Data availability
- ML maturity

Requested Stakeholders Involved



Executive
Sponsor

Line of
Business
SME

Data
SME

Data
Scientist
(optional)

Discovery Workshop: Deliverables



Document the opportunities discussed

Estimate the key criteria for each

Identify gaps in the criteria

Create draft prioritization

Use Case Scenario: Identifying a Target



C-Level Request



Increase Net Revenue

Executive Task



Increase Ad Impression Revenues

Division Task



Increase Subscriber Engagement

Data
Science
Tasks



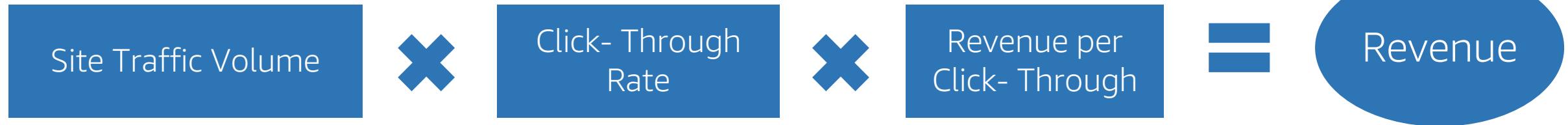
Categorize
Articles

Associate
Articles

Develop
Subscriber
Profiles

Match
Subscriber
Profile to
Articles

Use Case Scenario: Driving Results



CURRENT

10M / Mo

3.0%

\$0.20

\$60K

A 10% Improvement in each Metric

=
33% MORE
REVENUE

IMPROVED

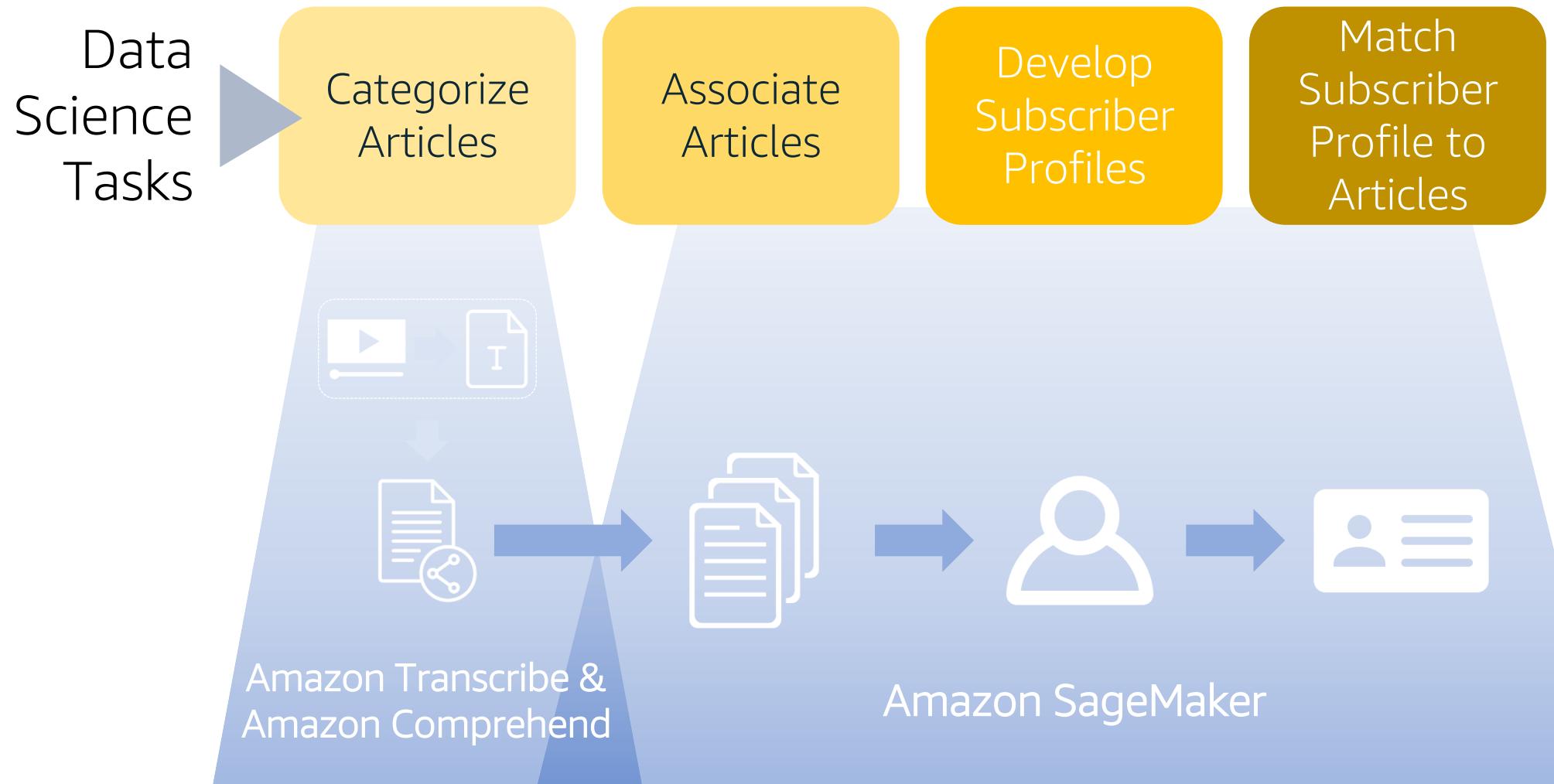
11M / Mo

3.3%

\$0.22

\$80K

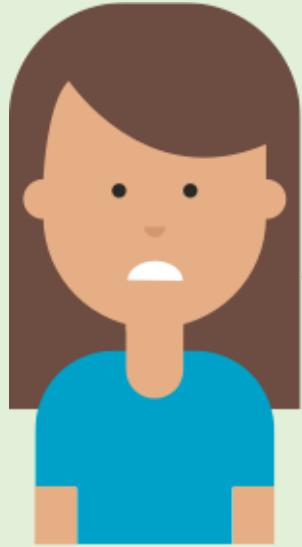
Use Case Scenario: Breaking it Down



Common ML Objections

Common ML Objections

Objection



My data quality
is poor.

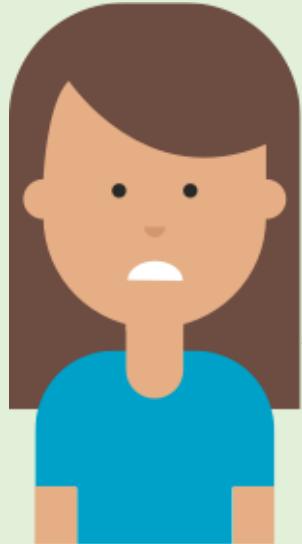
Response Points

- Most systems contain good- and poor-quality data; there's typically enough good data to derive insights.
- AWS can help assess data and identify data that is immediately usable for ML, and triage the remaining data for later use.
- ML adapts well to various types of dirty data without the need for cleansing.
- Mechanical Turk can be used for data cleansing.



Common ML Objections

Objection



ML hasn't worked for us or isn't applicable to our business.

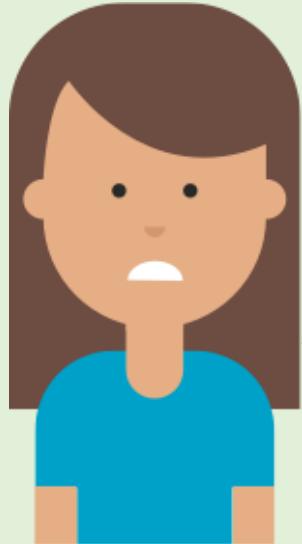
Response Points

- Some customers may have had poor experiences using ML or have worked with providers that have over-promised results.
- AWS assists their customers through the end-to-end process, keeping business results as our objective.



Common ML Objections

Objection



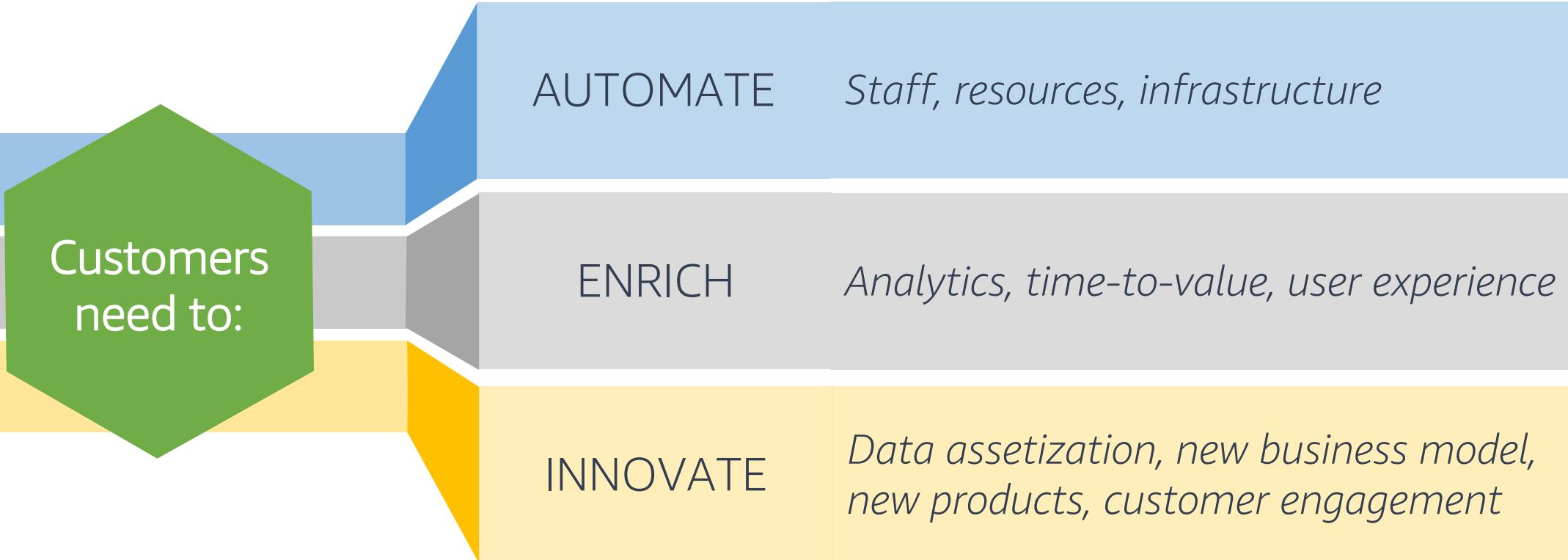
ML will take over my job function or expose my shortcomings.

Response Points

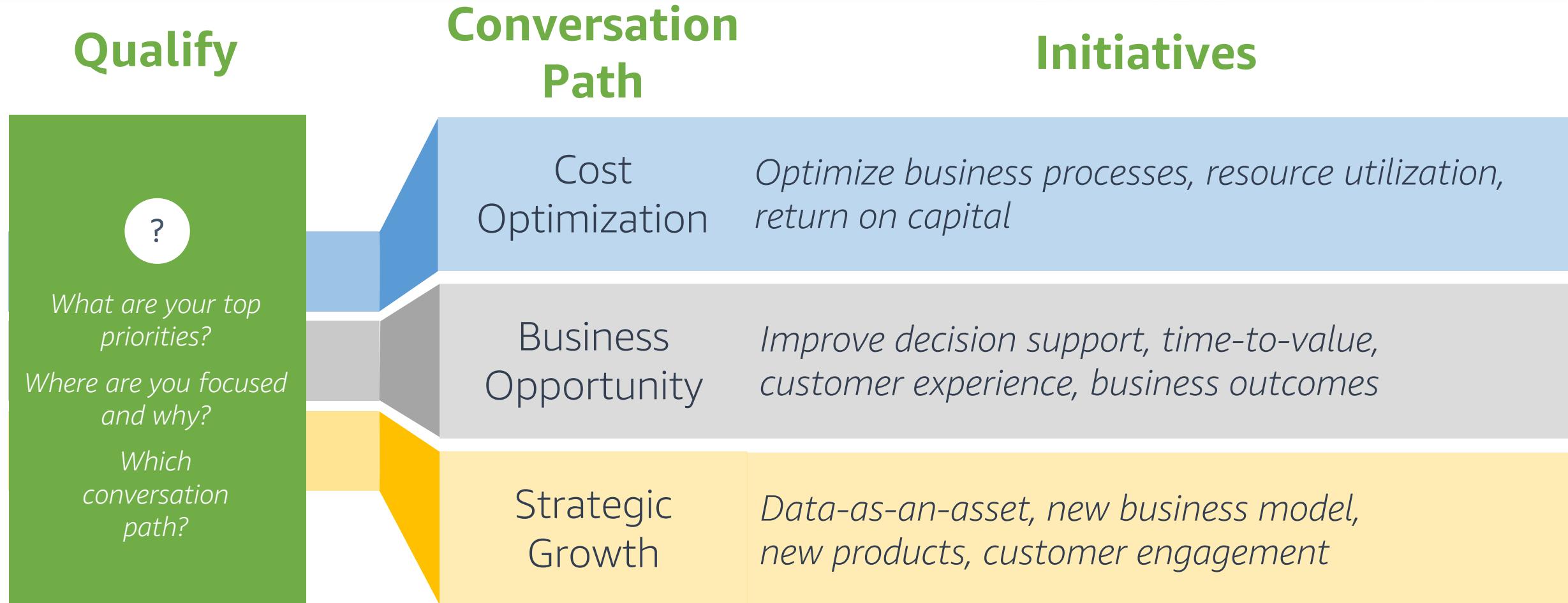
- Once data science is employed, there are a couple of impacts from a resourcing perspective.
- Customers will get more value from their existing resources and will be able to tackle backlogs that have laid stagnant.
- Skills escalate among team members as they learn how to create and/or use ML outputs.



Summary



Summary





Thanks for attending!

Please complete the Course Evaluation Survey



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