How Machine Learning can help you transform your business

Julien Simon, Principal Technical Evangelist, AI & ML
@julsimon

What to expect

- A flywheel for data
- Machine Learning @ Amazon
- Customer use cases
- Q&A

If I asked you…

“How important is it for your company to invest in Machine Learning?”

Most of you would probably answer:

“We’re not a Machine Learning company.”

”They’re not central to our business.”

“We have more important topics to address.”

Now, if I asked you…

"How important is it for your organization to build better products and deliver a better customer experience?"

Most of you would certainly answer:

"This is our number one priority."

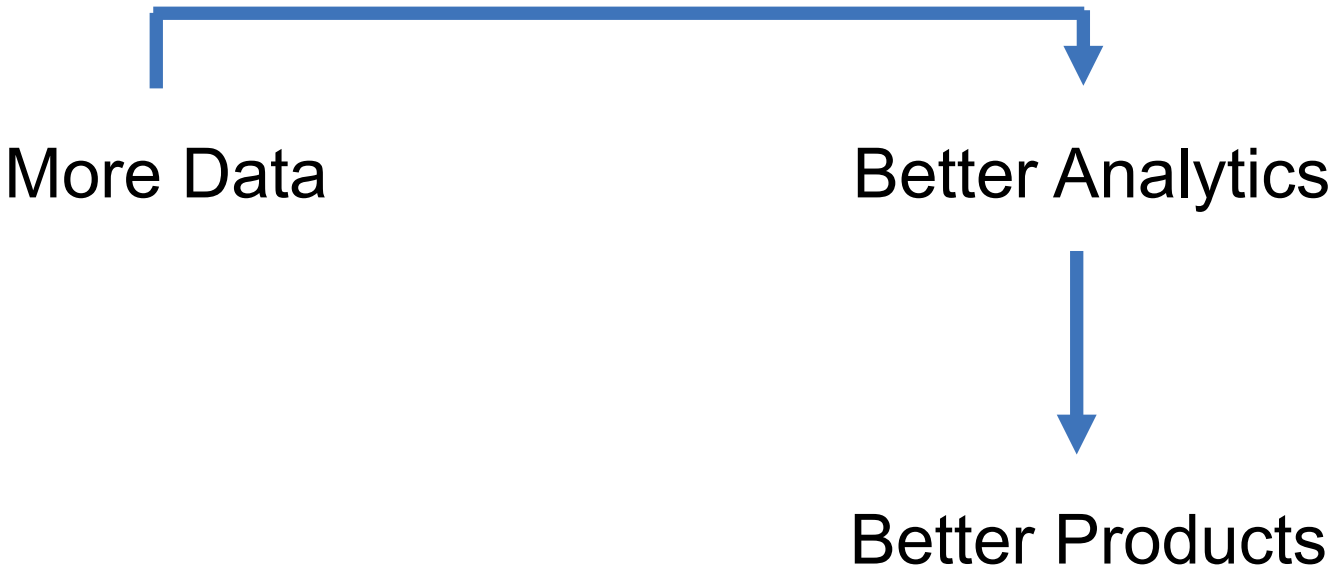
But isn't this the same question, really?

A Flywheel For Data

More Data

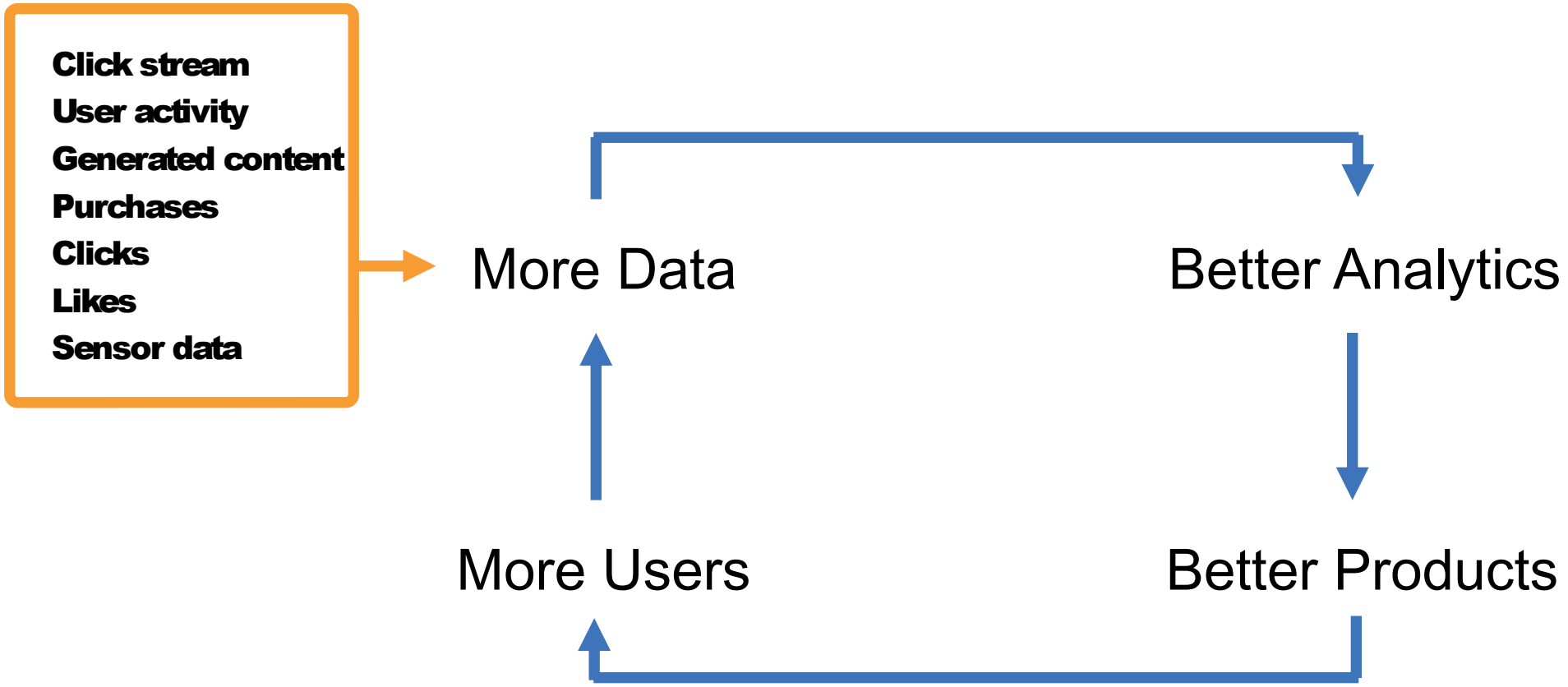
Better Analytics

A Flywheel For Data

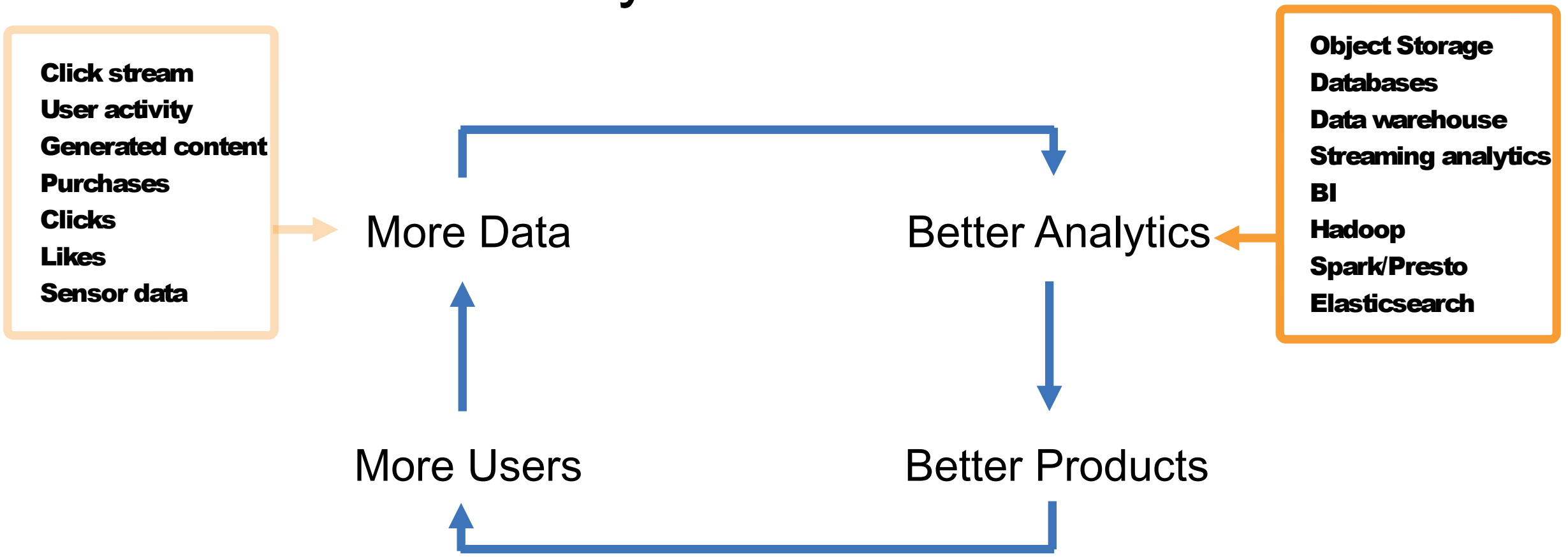


A Flywheel For Data

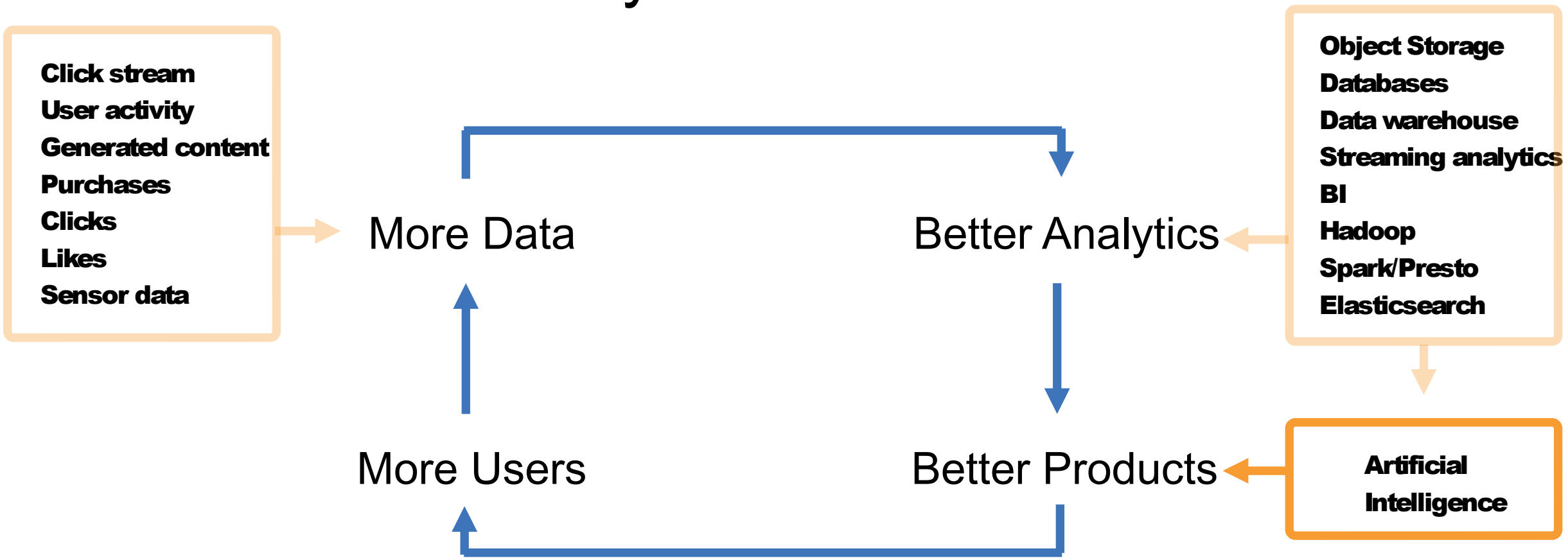
A Flywheel For Data



A Flywheel For Data

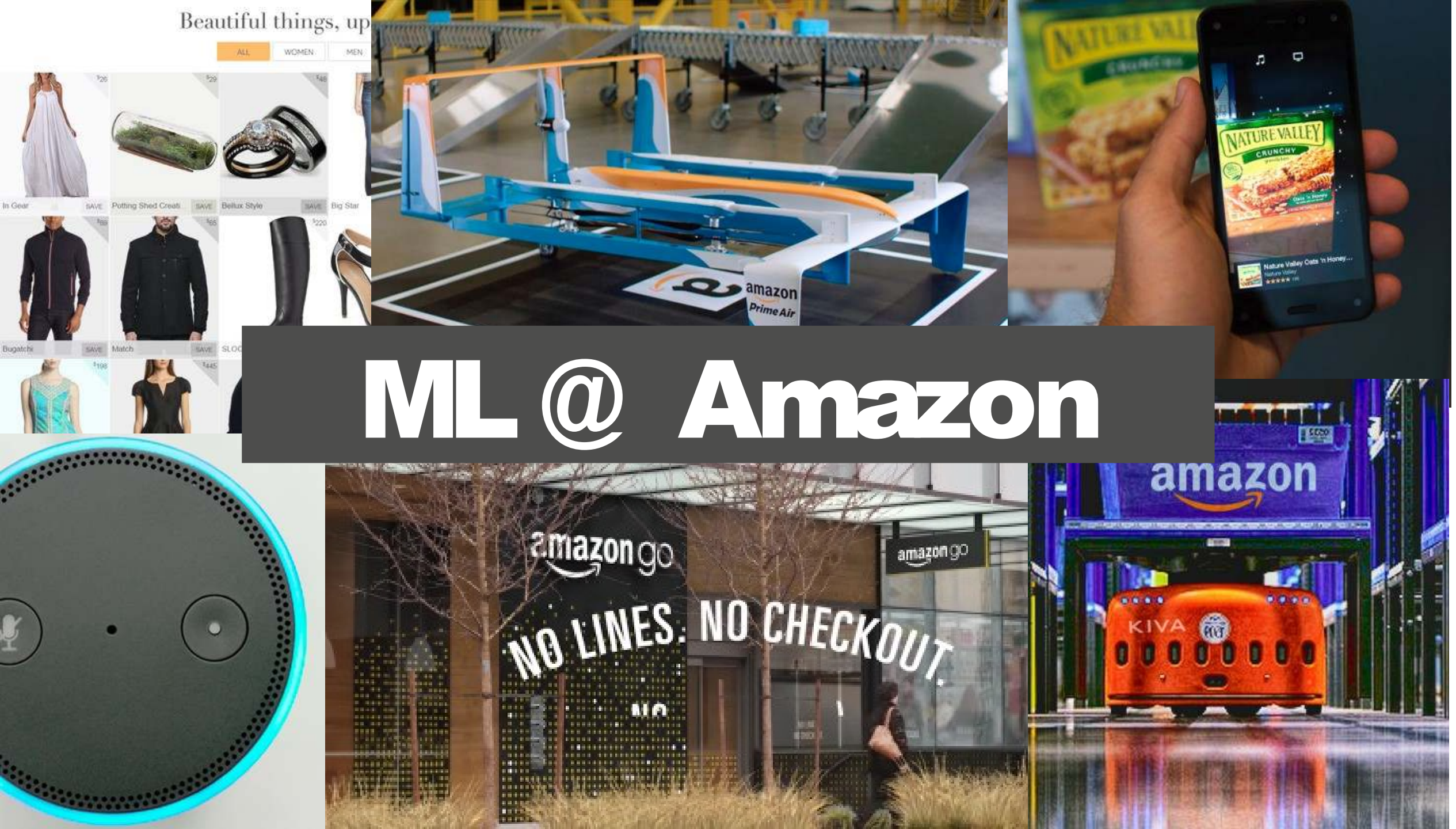


A Flywheel For Data



« There's an almost endless opportunity to leverage more data and to make more-informed decisions, with better context, and give each customer a differentiated experience. In many cases, you can even rethink and redesign the experience based on intelligence in ways that were not anticipated. »

Rob Alexander, CIO, Capital One

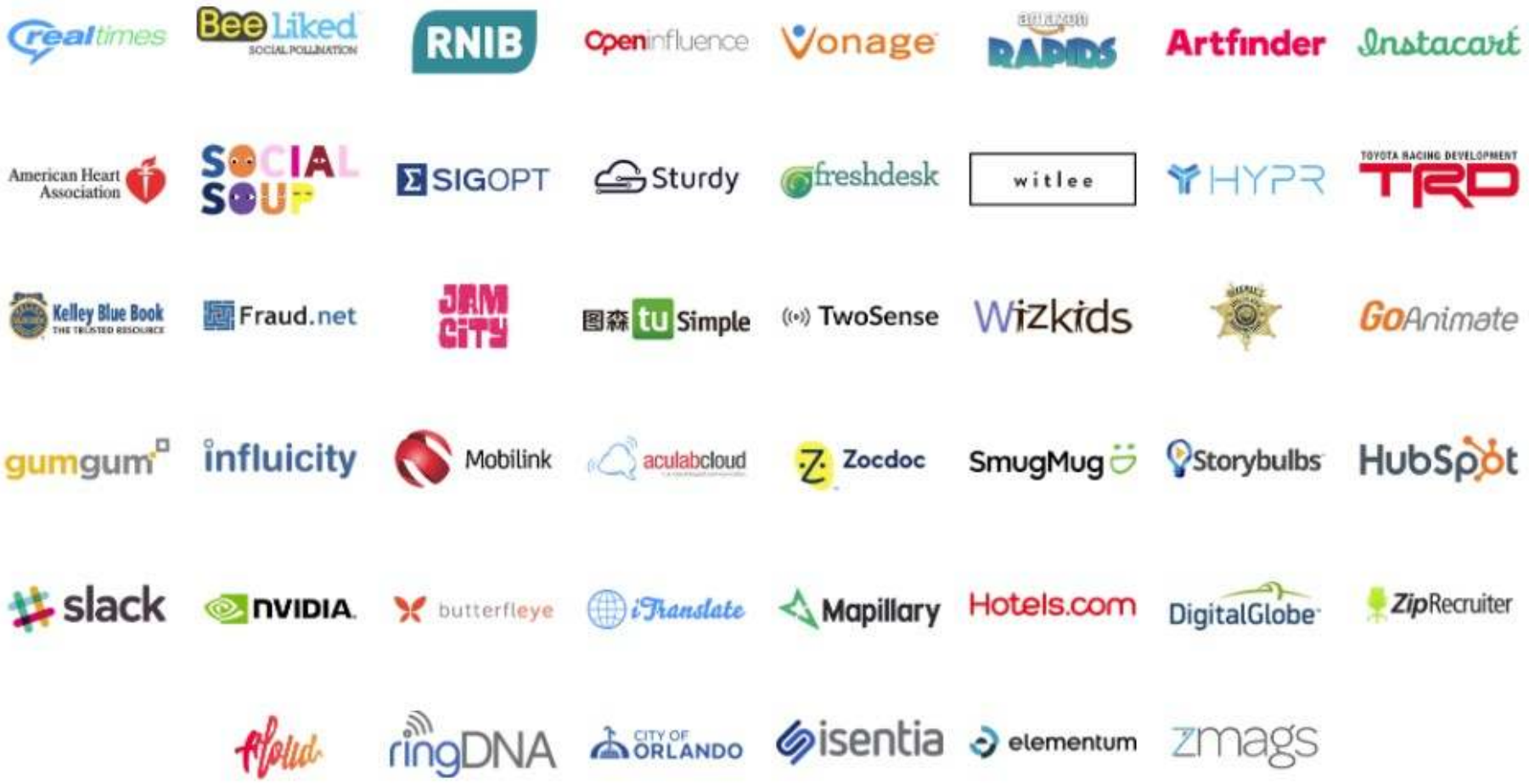

Beautiful things, up
ALL
WOMEN
MEN
In Gear
SAVE
Potting Shed Creati
SAVE
Belluc Style
SAVE
Big Star
Bugatchi
SAVE
Match
SAVE
amazon
Prime Air
NATURE VALLEY
CRUNCHY
Nature Valley Oats 'n Honey...
amazon go
NO LINES. NO CHECKOUT.
amazon
KIVA

ML @ Amazon

More ML is built on AWS than anywhere else

aws

More ML is built on AWS than anywhere else



aws

AWS ML Stack

Application Services	API-driven services: Vision, Speech & Language Services, Chatbots
Platform Services	Deploy machine learning models with high-performance machine learning algorithms, broad framework support, and one-click training, tuning, and inference.
Frameworks & Infrastructure	Develop sophisticated models with any framework, create managed, auto-scaling clusters of GPUs for large scale training, or run inference on trained models.

aws

- Artificial Intelligence: design software applications which exhibit human-like behavior, e.g. speech, natural language processing, reasoning or intuition

- Machine Learning: teach machines to learn without being explicitly programmed

- Deep Learning: using neural networks, teach machines to learn from complex data where features cannot be explicitly expressed

A few examples

Fraud detection	Detecting fraudulent transactions, filtering spam emails, flagging suspicious reviews, …
Personalization	Recommending content, predictive content loading, improving user experience, …
Targeted marketing	Matching customers and offers, choosing marketing campaigns, cross-selling and up-selling, …
Content classification	Categorizing documents, matching hiring managers and resumes, understanding visual content, …
Churn prediction	Finding customers who are likely to stop using the service, upgrade targeting, …
Customer support	Predictive routing of customer emails, social media listening, …
Predictive	Detect early signs of equipment failure

Customer use cases – Media

The Washington Post

Natural Language Processing

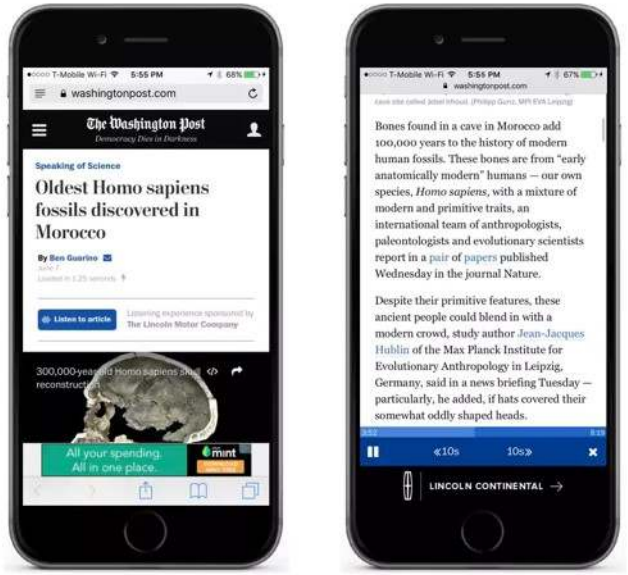
« The Post strives to give its nearly 100 million readers the best experience possible and relevant content recommendations are a key part of that mission. With ***Amazon Comprehend****, we can leverage the continuously-trained NLP capabilities like Keyphrase and Topic APIs to potentially allow us to provide even better content personalization, SEO, and ad targeting capabilities. »*

Dr. Sam Han, Director of Data Science, The Washington Post

Text to Speech

« This is a new technology that can give users more choice and better accessibility to our content, so we wanted to create an experiment to dive deeper into the user experience. After a month, we'll take what we've learned about how users engage with this feature to develop our first iteration of a product with ***Amazon Polly****. »*

Joseph Price, Product Manager, The Washington Post



https://www.washingtonpost.com/pr/wp/2017/06/09/the-washington-post-to-start-experimenting-with-audio-articles-using-amazon-polly

CSPAN

- C-SPAN is a public service that provides proceedings of the U.S. House of Representatives and the U.S. Senate.
- With 3 network stations and 5 other video feeds, there is a lot of content that must be indexed and made searchable.
- Previously, this was done manually. Indexers scrolled through screen captures to identify who was speaking at any given point and select an image to represent each individual in each video.

Face detection and comparison

« By using **Amazon Rekognition**, we are able to tag who is speaking / on camera at what time down to the second, if needed. Rekognition allows us to index twice as much content as we do currently - from 3500 hours a year to 7500 hours a year which would allow us to index 100% of our first run content and it was shockingly easy to set up, even with 97,000 entities from our database. »

Alan Cloutier, Technical Manager, C-SPAN

https://aws.amazon.com/solutions/case-studies/cspan/

GumGum

- GumGum unlocks the value of images in advertising &professional sports.
- Mantii, GumGum's real-time social media listening tool can analyze the more than 1.8 billion social images posted daily, where 80% of them lack text to help marketers find them.
- Using **Deep Learning** with **Apache MXNet** and **GPU instances**, the company reduced model training time from 21 hours to 6 hours.

https://aws.amazon.com/solutions/case-studies/gumgum/

Customer use cases – FSI

Capital One

- The arrival of chatbots and robo-advisors is the tip of the disruptive iceberg in the industry.
- Capital One is applying AI to the customer experience with nuanced fraud and lending decisions, in addition to chatbots.

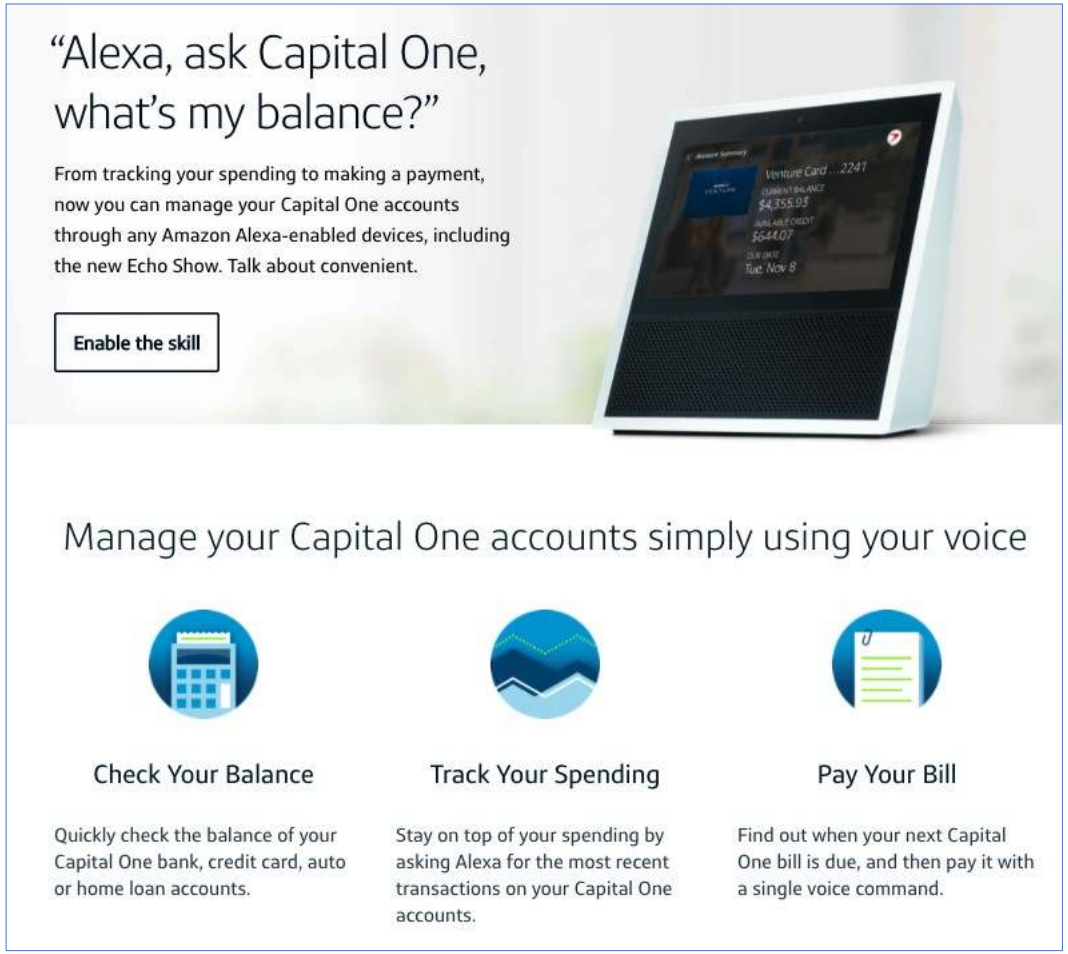
Deep Learning

« We're focused on building capabilities around what we call explainable AI. We think it's important to have models that aren't just black-box models but ones that enable us to understand why deep learning and neural net models are making the decisions they're making. Financial services can help people achieve their dreams, but when it's done poorly, an institution can get in the way of someone's dreams. »

Rob Alexander
Chief Information Officer, Capital One

http://www.zdnet.com/video/how-capital-one-builds-its-ai-and-machine-learning-efforts-on-aws/

Capital One



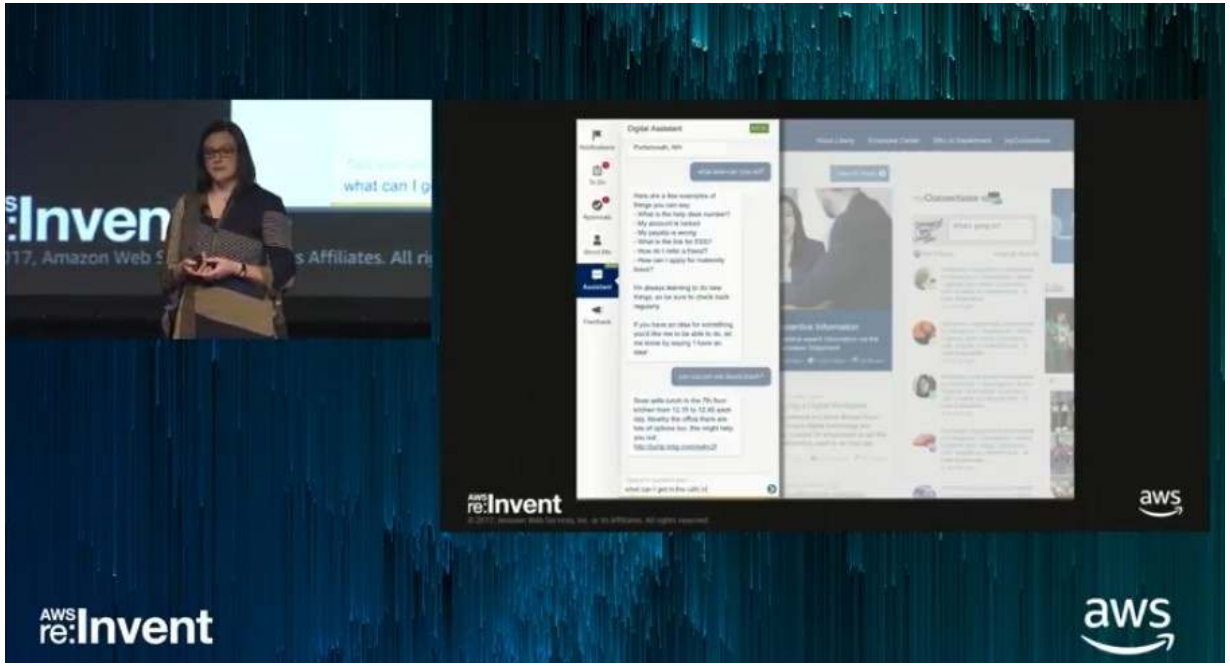
https://www.capitalone.com/applications/alexa/

Liberty Mutual

Speech Recognition and Natural Language Understanding

*« **Amazon Lex** integrates easily into our existing applications, as well as our new cloud-native serverless architectures, enabling us to rapidly take advantage of these powerful technologies to improve and extend the capabilities we can offer our employees and customers.»*

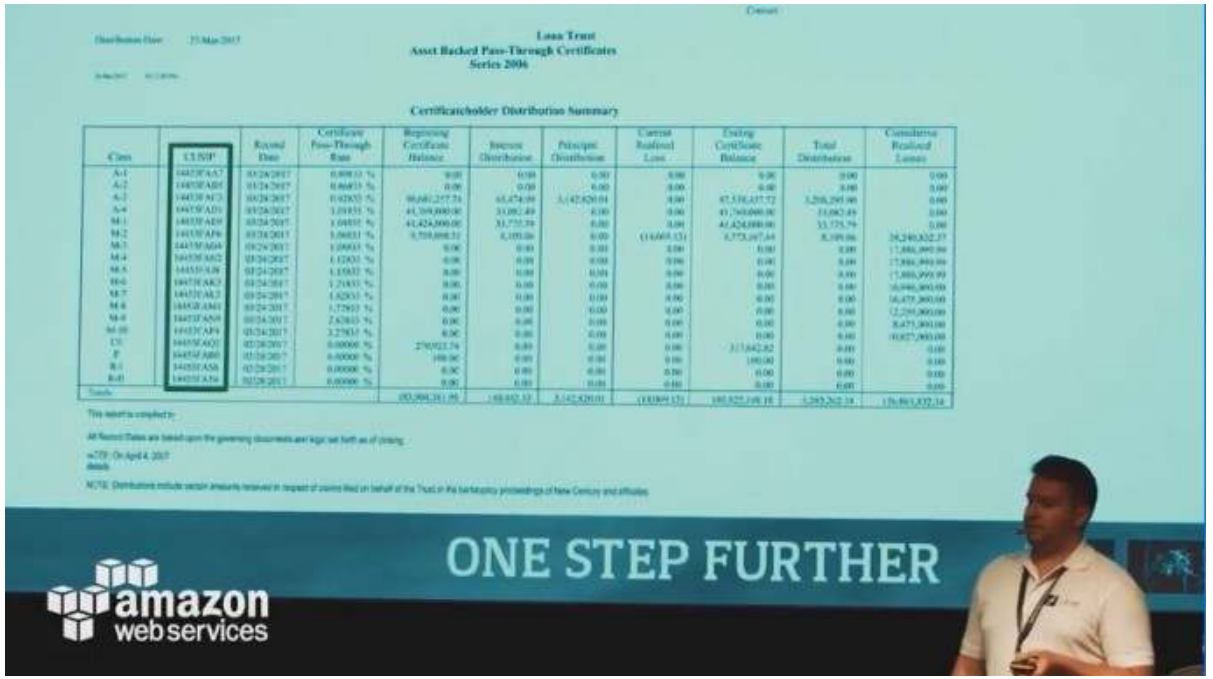
Gillian Armstrong, Technologist, Liberty Mutual



https://www.youtube.com/watch?v=TeLvFqLW_0A

SCDM

- SCDM Financial uses Deep Learning to extract information about markets and consumers from mountains of documents and publicly available data.
- Using the **Deep Learning AMI** and **TensorFlow**, SCDM was able to build a solution in less than 3 months.



https://aws.amazon.com/de/solutions/case-studies/SCDM/

Customer use cases – Healthcare

ZocDoc

ZocDoc
Get well sooner.

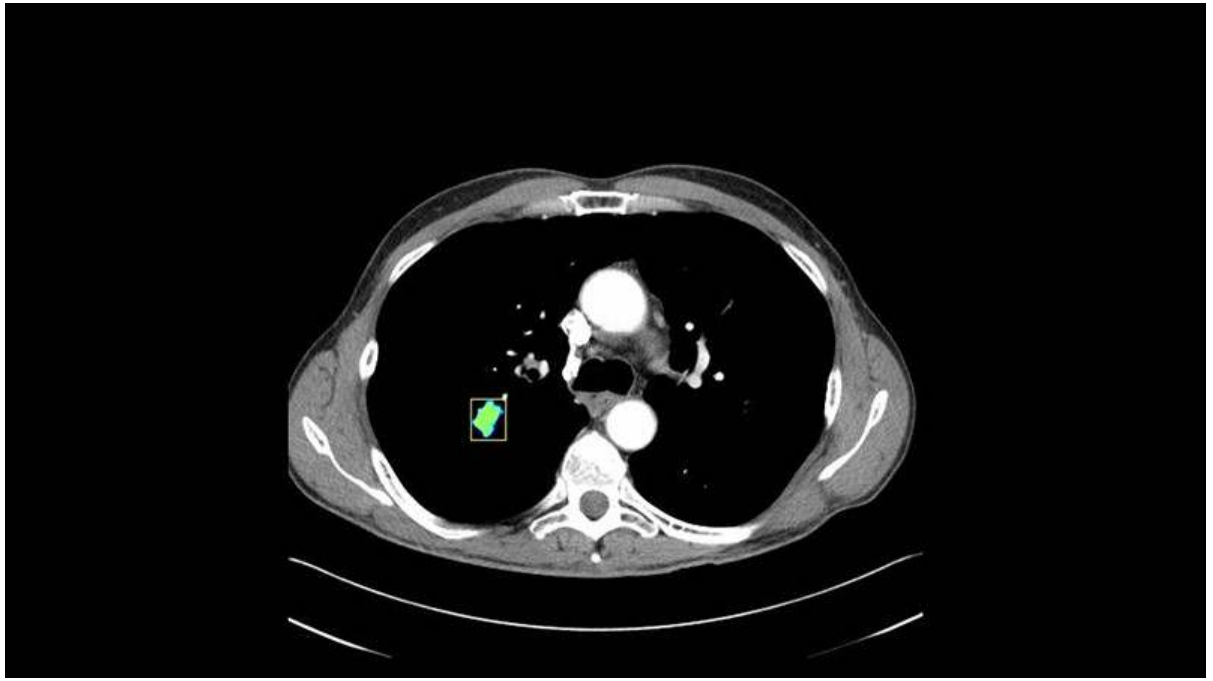
- Zocdoc is an online healthcare scheduling service, integrating information about medical practices and doctors' individual schedules in a central location.
- Zocdoc's engineering and data science teams were able to create a neural network proof-of-concept in just one day by using the **Deep Learning AMI**, **TensorFlow** and **GPU instances**.

https://aws.amazon.com/blogs/machine-learning/zocdoc-builds-patient-confidence-using-tensorflow-on-aws/

aws

Matrix Analytics

- Matrix Analytics is helping to save lives. The Colorado-based startup uses Deep Learning (**Deep Learning AMI**, **TensorFlow**, **GPU instances**) to track disease progression for patients diagnosed with pulmonary nodules in their lungs.
- The Matrix Analytics tools are able to outperform previous methods in their ability to diagnose cancer from a CT image.
- The software automates follow-up care to ensure that each patient follows through with recommendations in order to monitor changes in their condition.



Deep Learning

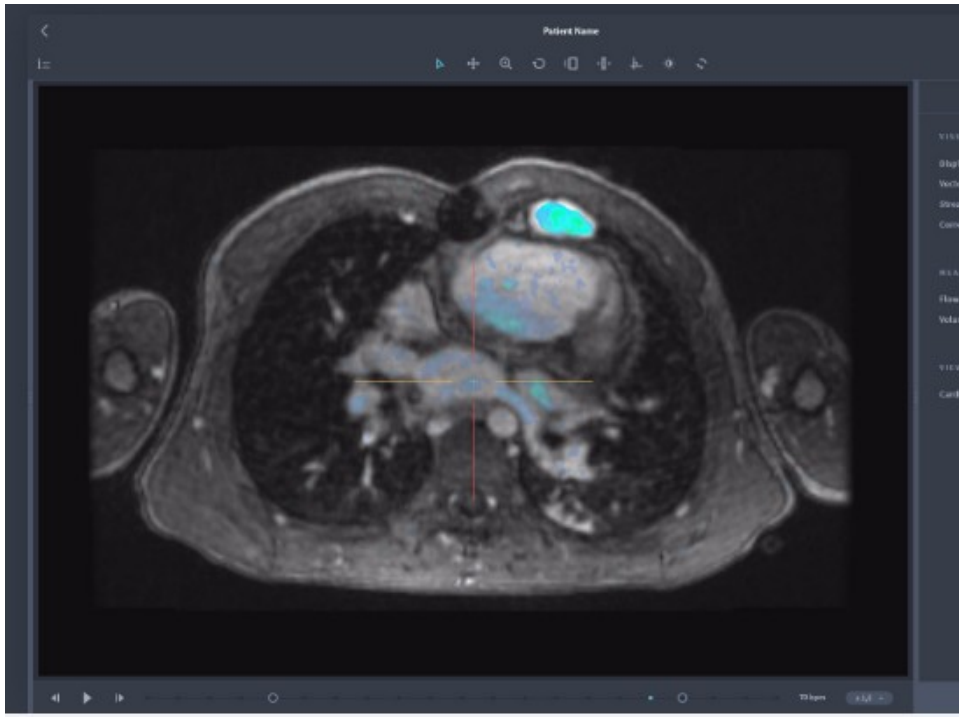
« Using the convenience of the [Deep Learning] AMI on AWS gives us the opportunity to offer up different business models, which allows us to become excellent technology partners as the market evolves at an ever-increasing pace.

Dr. Aki Alzubaidi, Founder, Matrix Analytics

https://aws.amazon.com/blogs/machine-learning/matrix-analytics-uses-deep-learning-on-aws-to-boost-early-cancer-detection/

Arterys

- Arterys provides a blood flow imaging solution that enables doctors to render MRI scans in multi-dimensional models and better diagnose patients for cardiovascular diseases.
- Arterys built its imaging solution on AWS to take advantage of **GPU instances**.
- By using AWS, Arterys can render MRI scans in 10 minutes or less instead of the industry standard of 90 minutes while making sure its platform meets HIPAA-compliance requirements.



https://aws.amazon.com/solutions/case-studies/arterys/

Customer use cases – Manufacturing

John Deere

- The company's Precision Agriculture platform enables farmers and their advisors to react to data in real time.
- The result is precision farming, where problems are detected and solved quickly, often before they arise.

Computer Vision

"AI in combination with computer vision can replace the eyes of the grower. As a sprayer goes through the field, for example, it diferentiates between a weed and a plant—and distinguishes a healthy plant from an unhealthy plant.…AI will take productivity to a level we haven't seen in agriculture."

Predictive Analytics

"By monitoring machines remotely as they're in the field, we can maximize their functions and increase crop yield. We can do a lot of predictive analysis and sense mechanical failures before they even happen. Being able to monitor how the machines are performing is a huge benefit to us as a company and also a big benefit to our customers."

John May, Chief Information Officer, John Deere

https://www.youtube.com/watch?v=uq4kQPsM4cQ

TuSimple

- TuSimple, a leader in self-driving technology, uses Deep Learning to build sophisticated algorithms for computer vision and driving simulation.
- Using **Apache MXNet**, they simulated a billion miles of road driving with a wide range of variables and driving conditions—the largest simulation of its kind in history.

https://www.oreilly.com/ideas/self-driving-trucks-enter-the-fast-lane-using-deep-learning

PowerScout

PowerScout

- PowerScout is changing the sales model for solar-powered homes by using Deep Learning to identify households likely to embrace solar panels.
- Moving away from the door-to-door sales approach, the company's deep learning models analyze satellite imagery to evaluate solar-worthy factors for each home.
- PowerScout uses **GPU instances** and the **cuDNN** Deep Learning library.

https://blogs.nvidia.com/blog/2016/12/27/ai-solar-powered-homes/

aws

Customer use cases – Retail

Hotels.com

Machine Translation

« We operate 90 localized websites in 41 languages. (…)

*Having evaluated **Amazon Translate** and several other solutions, we believe that Amazon Translate presents a quick, efficient and most importantly, accurate solution.»*

Natural Language Processing

*« **Amazon Comprehend** helps us analyze the key sentiments, objects, and geos in our 30 million plus reviews & testimonies. Now we are able to discover new insights into the unique experiences available at each property, so our customers can make the best decision possible for their travel."*

Matt Fryer, VP and Chief Data Science Officer, Hotels.com

Expedia

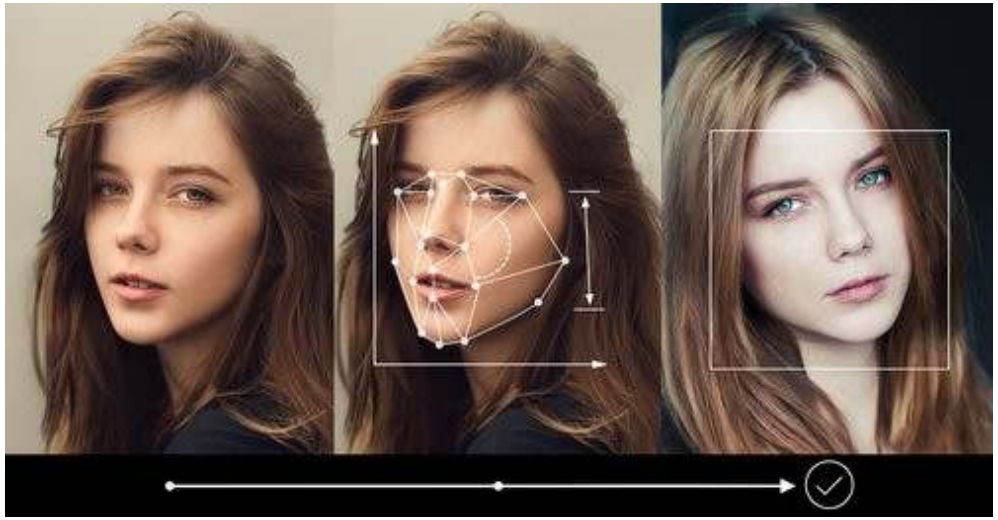
- Expedia have over 10 million images from 300,000 hotels.
- Using great images boosts conversion.
- Using **Keras** and **GPU instances**, they fine-tuned a pre-trained Convolutional Neural Network using 100,000 images
- Hotel descriptions now automatically feature the best available images

https://news.developer.nvidia.com/expedia-ranking-hotel-images-with-deep-learning/

Customer use cases – Safety

Marinus Analytics

- Marinus Analytics provides law enforcement with tools, founded in artificial intelligence, to turn big data into actionable intelligence.
- Traffic Jam, is a suite of tools for use by law enforcement agencies on sex trafficking investigations.
- Before using **Amazon Rekognition**, their only recourse was to manually sift through online data to try to find them; this was time-intensive or not possible.
- Now, investigators are able to take effective action by searching through millions of records in seconds to find victims.



http://www.marinusanalytics.com/articles/2017/10/17/amazon-rekognition-helps-marinus-analytics-fight-human-trafficking

aws

City of Orlando

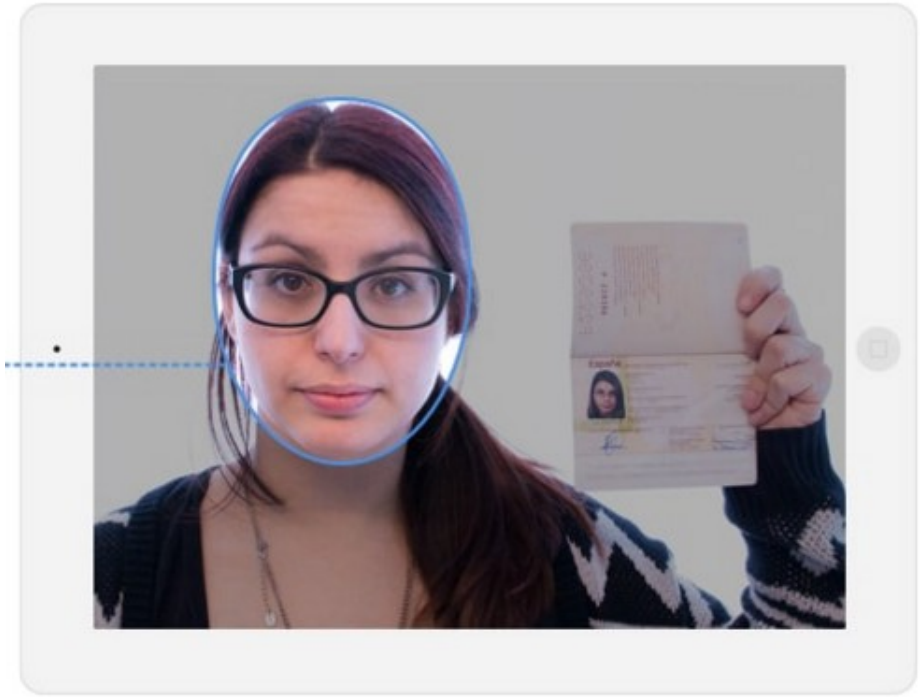
Real-time video analysis

”The City of Orlando is excited to work with Amazon to pilot the latest in public safety software through a unique, first-of-it's-kind public-private partnership. Through the pilot, Orlando will utilize **Amazon Rekognition Video** and **Amazon Kinesis Video Streams** technology in a way that will use existing City resources to provide real-time detection and notification of persons-of-interests, further increasing public safety, and operational efficiency opportunities for the City of Orlando and other cities across the nation”.

John Mina, Police Chief, City of Orlando

Onfido

- Onfido uses Deep Learning to help companies verify identities and carry out adverse-history searches at scale.
- They use **TensorFlow** for supervised and unsupervised learning of data corpus in Amazon S3 to optimize Deep Learning models.
- Onfido rely on **GPU instances** for training computer vision models that allow fast and accurate analysis of images such as passports and driver licenses.



https://www.periscope.tv/AWSstartups/1LyGBBADmDWGN

Customer use cases
– Enterprise applications

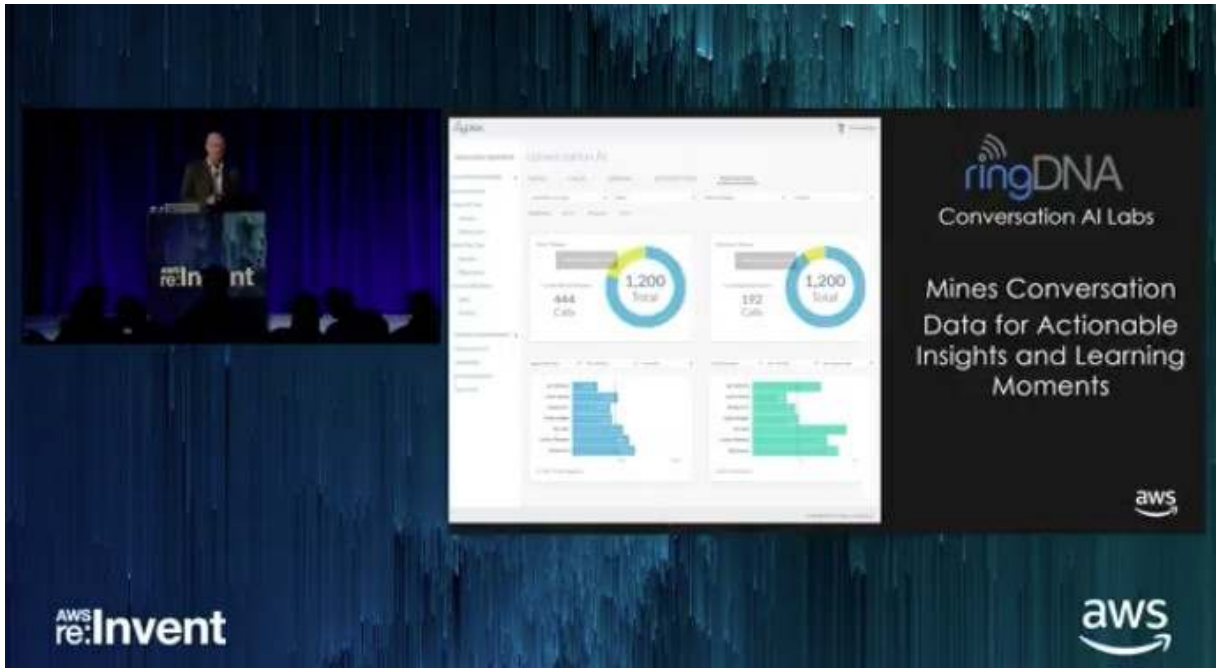
ringDNA

- RingDNA is an end-to-end communications platform for sales teams.
- Hundreds of enterprise organizations use RingDNA to dramatically increase productivity, engage in smarter sales conversations, gain predictive sales insights and improve their win rate.

Speech to Text

"A critical component of RingDNA's Conversation AI requires best of breed speech-to-text to deliver transcriptions of every phone call. RingDNA is excited about ***Amazon Transcribe*** *since it provides high-quality speech recognition at scale, helping us to better transcribe every call to text "*

Howard Brown, CEO & Founder, RingDNA



https://www.youtube.com/watch?v=1ZJ_f1bDdog

aws

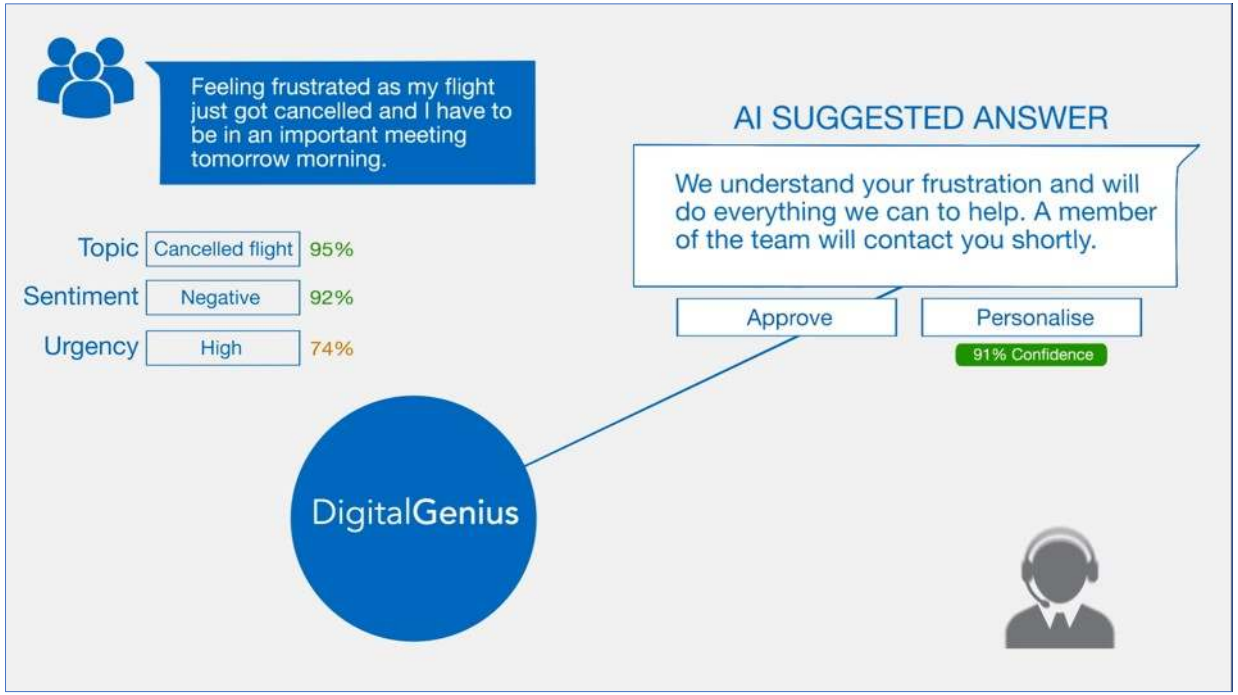
Digital Genius

DigitalGenius is an AI-powered customer service solution that monitors social media, texts and email for negative customer sentiment, identifies cases that need more attention, and suggests ideal responses to queries.

Scaling on the cloud

« ***NVIDIA GPUs*** *make it possible for us to train very large neural nets with millions of parameters in a matter of hours rather than days* »

Mikhail Naumov, President, DigitalGenius



https://blogs.nvidia.com/blog/2017/01/27/faster-customer-service-with-ai/

Getting started

AWS ML Stack

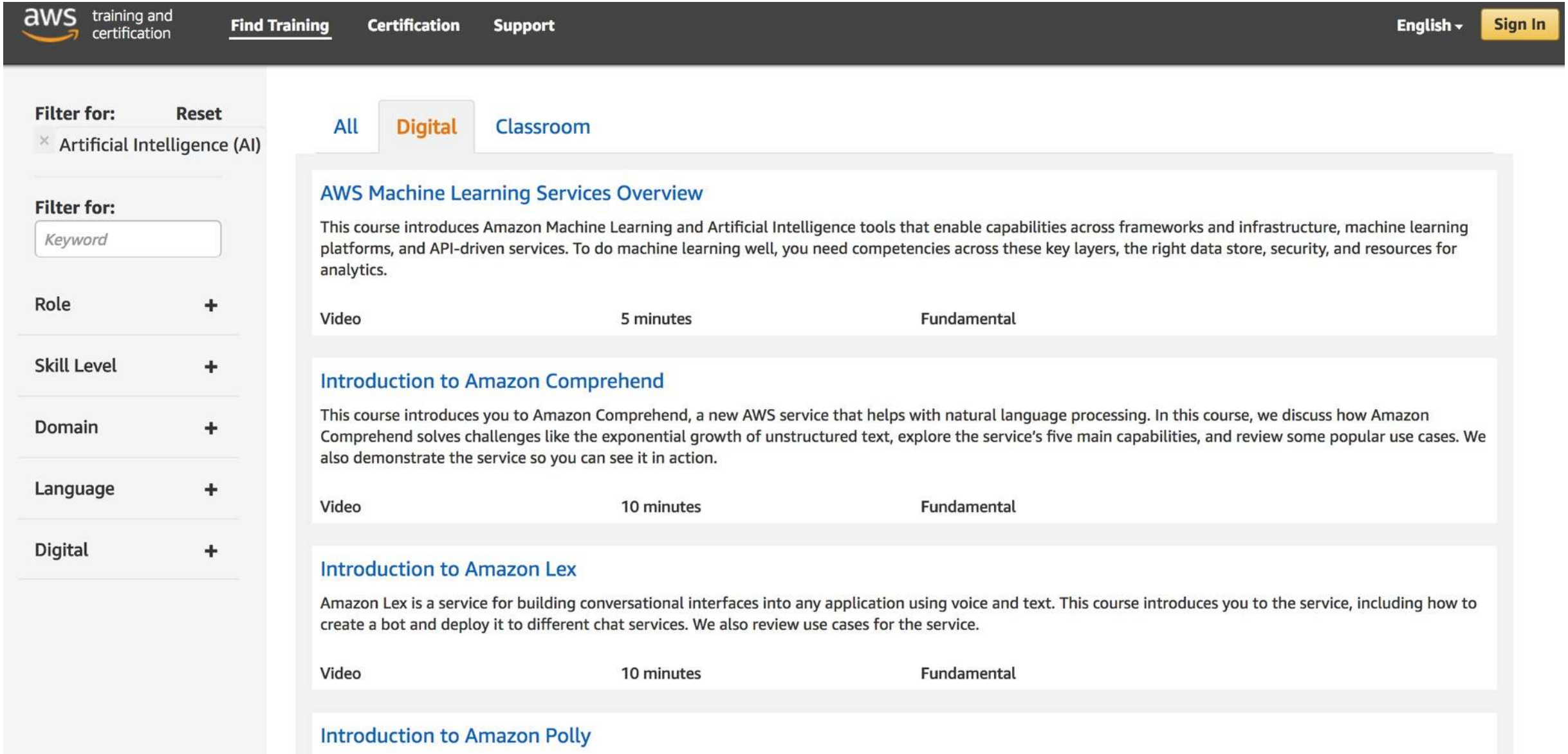
Application Services	API-driven services: Vision, Speech & Language Services, Chatbots
Platform Services	Deploy machine learning models with high-performance machine learning algorithms, broad framework support, and one-click training, tuning, and inference.
Frameworks & Infrastructure	Develop sophisticated models with any framework, create managed, auto-scaling clusters of GPUs for large scale training, or run inference on trained models.

https://ml.aws

aws

Digital Training

https://aws.training



Amazon ML Lab

Lots of companies doing Machine Learning

Lack ML expertise

Unable to unlock business potential

Amazon ML Lab provides the missing ML expertise

Leverage Amazon experts with decades of ML experience with technologies like Amazon Echo, Amazon Alexa, Prime Air and Amazon Go

Brainstorming

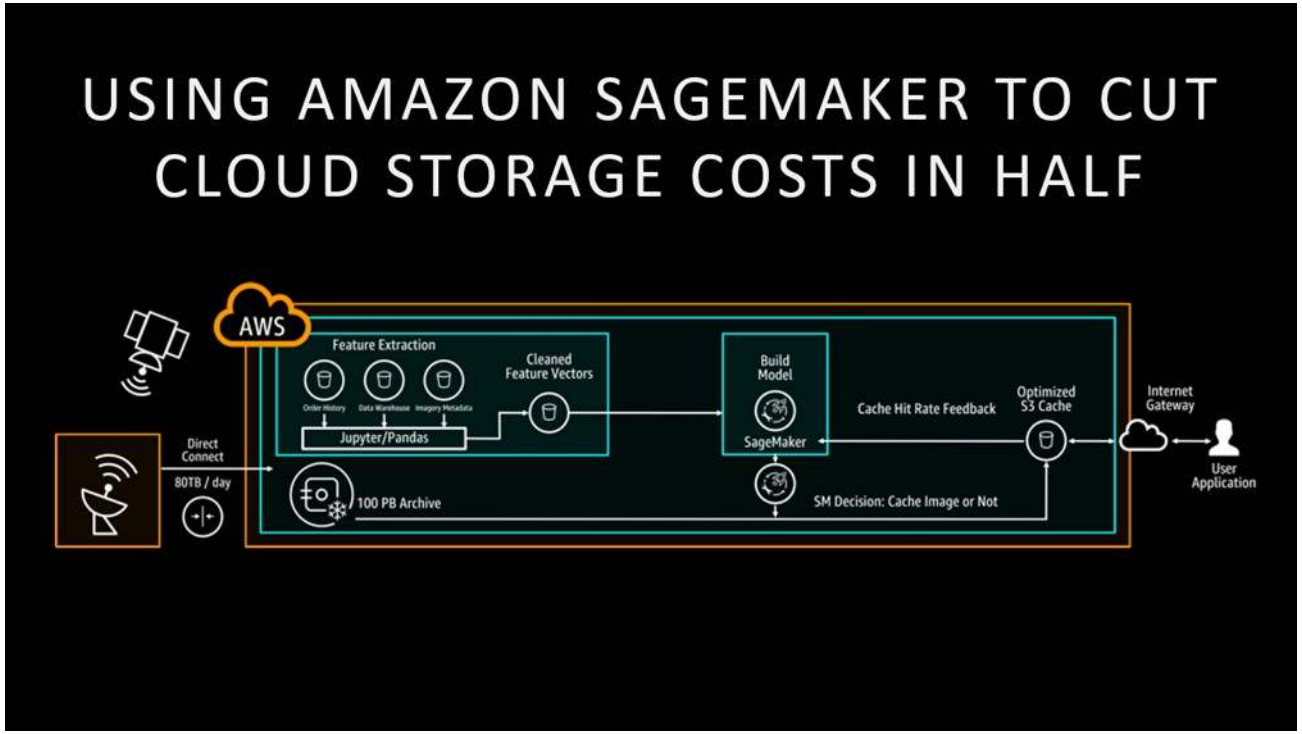
Modeling

Teaching

https://aws.amazon.com/ml-solutions-lab/

Digital Globe

- In the last 18 years DigitalGlobe has been operating Earth imaging satellites, they have collected over 100 PB of imagery.
- There is a trade-off between how quickly data can be accessed and how much it will cost to store.
- Working with the ML Lab, Digital Globe built a predictive model that will reduce cloud storage costs for their imagery archive by 50%.



http://blog.digitalglobe.com/industry/using-machine-learning-to-save-money-on-cloud-data-storage/

AWS Machine Learning Partner Solutions

Data Services
APN Partners providing solutions or services that help data scientists and Machine Learning practitioners prepare and/or annotate their enterprise data for training of a predictive model.

Platform Solutions
APN Partners enabling data scientists and Machine Learning practitioners with tools to take their data, train predictive models and make predictions on new data.

SaaS and API Solutions
APN Partners offering solutions that enable predictive capabilities within customer applications.

https://aws.amazon.com/machine-learning/partner-solutions/

aws

Thank you!

Julien Simon, AI Evangelist, EMEA
@julsimon